AVX **High Power Capacitors For Power Electronics**

Version 9.5

A KYOCERA GROUP COMPANY

www.avx.com

Contents

Capacitors for High Power Electronics

FIM PRODUCTS 2-10

Technology 2

Characteristics 3

General Description 4-10

CAPAFIM PRODUCTS 11-14

Table of Values 12-13

Mechanical Design 14

TRAFIM PRODUCTS 15-22

Table of Values 17-20

Mechanical Design 21

Terminals and Connections 22

FILFIM PRODUCTS 23-27

Table of Values 25-26

Mechanical Design 27

CALCULATION FORM 28

DISFIM PRODUCTS 29

GUIDE FOR CUSTOMER'S SPECIFIC REQUIREMENTS 30

AVX PRODUCTS LISTING 31

TPC (acquired by AVX Corporation in 1998) is at the forefront of high performance film capacitor technology improvements for 30 years.

In 1979, we developed CONTROLLED SELF-HEALING technology specifically to enhance the performance of film power capacitors.

This enables the capacitor to continue to function without catastrophic failure by insulating the weak points of the dielectric material. During operation, the capacitor behaves like a battery. It will consume capacitance via the gradual breakdown of individual cells until it decreases down to 2% of the original value.

Since 1988, FIM technology launching year, we continuously improve performances to meet DC filtering power applications.

FIM technology with polypropylene **F**ilm, vegetable oil **I**mpregnated and aluminium **M**etallization combines totally safe behavior and high energy density.

FIM technology is available in CAPAFIM, TRAFIM and FILFIM ranges for DC filtering applications.

Also available in DISFIM range for energy storage and discharge applications.

ELECTRICAL CHARACTERISTICS FOR DC FILTERING

C_n Capacitance	Nominal value of the capacitance measured at θ_{amb}=25±10°C.
V_n Rated DC voltage	Maximum operating peak voltage of either polarity (non-reversing type waveform), for which the capacitor has been designed for continuous operation.
V_w Working voltage	Value of the maximum operating recurrent voltage for a given hot spot temperature and an expected lifetime.
V_r Ripple voltage	Peak-to-peak alternating component of the unidirectional voltage.
V_I Insulation voltage	Rms rated value of the insulation voltage of capacitive elements and terminals to case.
L_s Stray inductance	Capacitor series self-inductance.
R_s Capacitor series resistance	Capacitor series resistance due to galvanic circuit.
tan δ Tangent of loss angle	Ratio between the equivalent series resistance and the capacitive reactance of a capacitor at a specified sinusoidal alternating voltage, frequency and temperature.
I_{rms} Working current	Rms current value for continuous operation.
I_{max} Maximum current	Maximum Rms current value for continuous operation.

THERMAL CHARACTERISTICS

θ_{amb} (°C) Cooling air temperature	Temperature of the cooling air measured at the hottest position of the capacitor, under steady-state conditions, midway between two units. NOTE If only one unit is involved, it is the temperature measured at a point approximately 0.1 m away from the capacitor container and at two-thirds of the height from its base.
θ_{HS} (°C) Hot spot temperature	Highest temperature obtained inside the case of the capacitor in thermal equilibrium.
θ (°C) Operating temperature	Temperature of the hottest point on the case of the capacitor in thermal equilibrium.
θ_{min} (°C) Minimum operating temperature	Lowest temperature of the dielectric at which the capacitor may be energized.
θ_{max} (°C) Maximum operating temperature	Highest temperature of the case at which the capacitor may be operated.

FIM Products

General Description

Three series, for DC filtering applications, are proposed with nominal voltage from 1200V up to 56kV.

CAPAFIM

DC filtering application up to 3.9kV

Capacitance up to 1620µF

TRAFIM

DC filtering application up to 6kV

Capacitance up to 16100µF

- Standard shape base 340x165
- Book shape base 340x117 which allows:

Lower thermal resistance	Higher Rms current capability
Lower serial resistance	Higher thermal exchange
Lower stray inductance	

FILFIM

High voltage DC filtering available up to 100kV on specific design

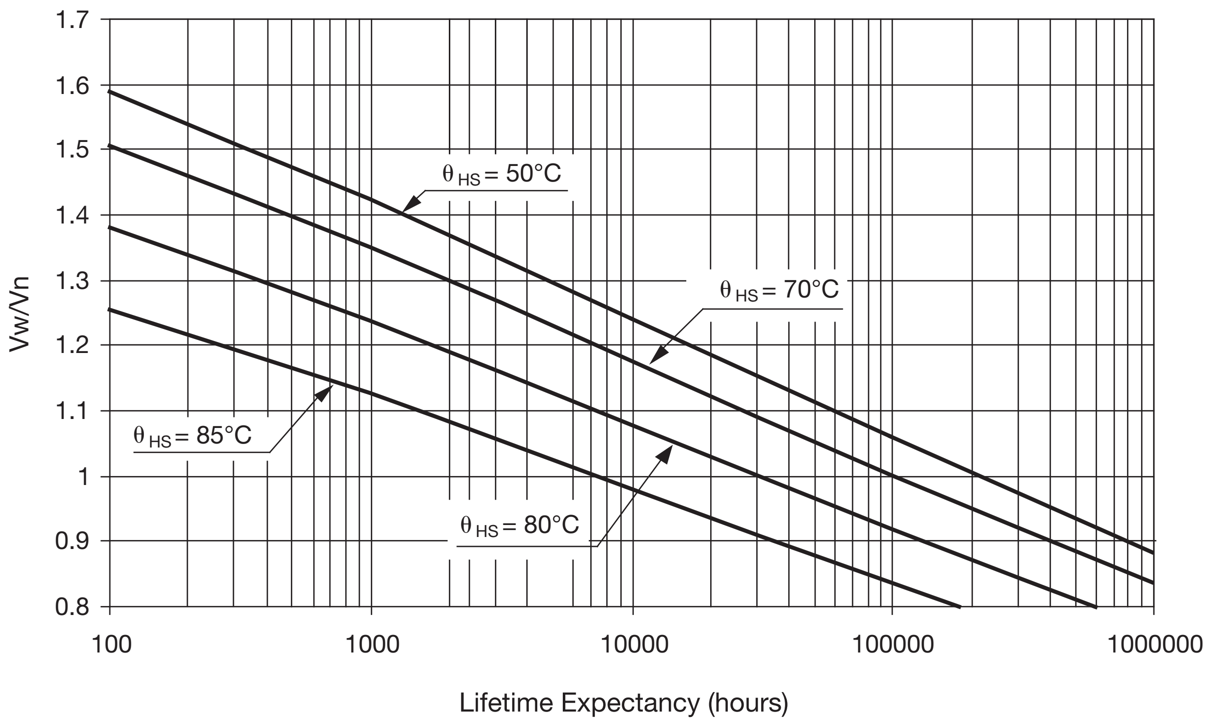
Capacitance up to 612µF

For any specific request about capacitance value, voltage, size or shape, contact your AVX local representative request by using the form on page 30.

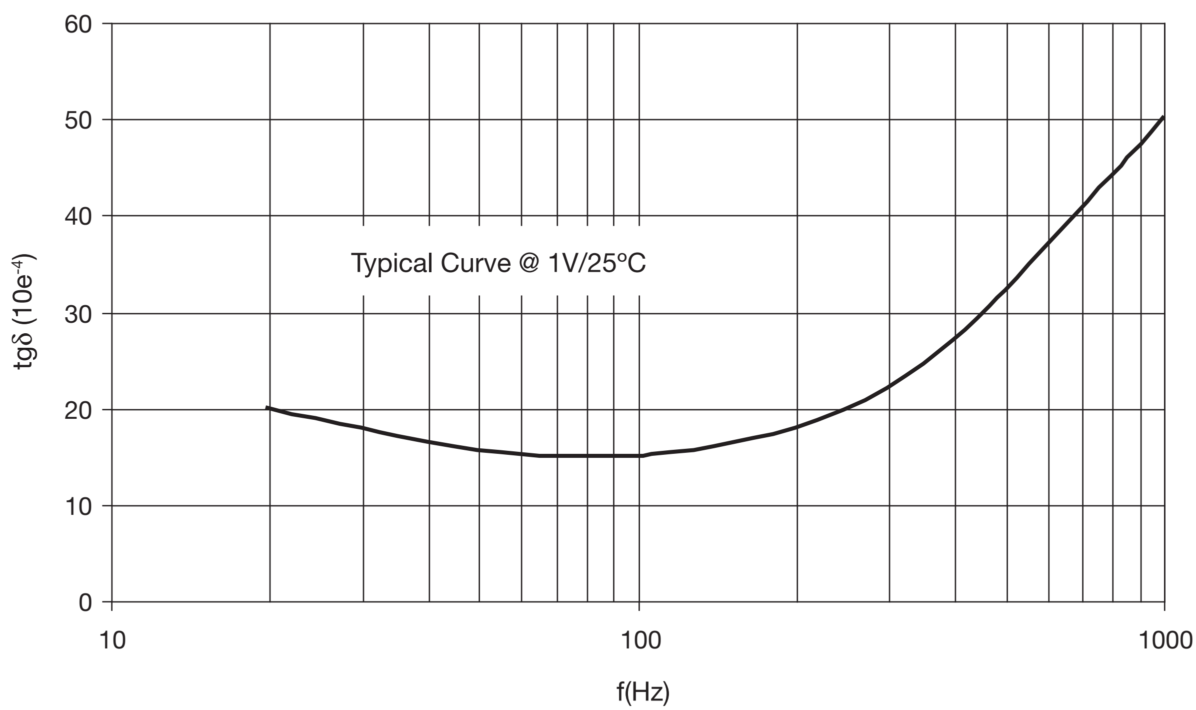
STANDARDS

IEC61071	Capacitors for power electronics
IEC61881	Capacitors for power electronics, railway applications, rolling stock equipment
IEC61373	Railway applications, rolling stock equipment, shock and vibration tests
IEC60068	Environmental testing
NFF16-101	Railway rolling stock, fire behavior
NFF16-102	Railway rolling stock, fire behavior

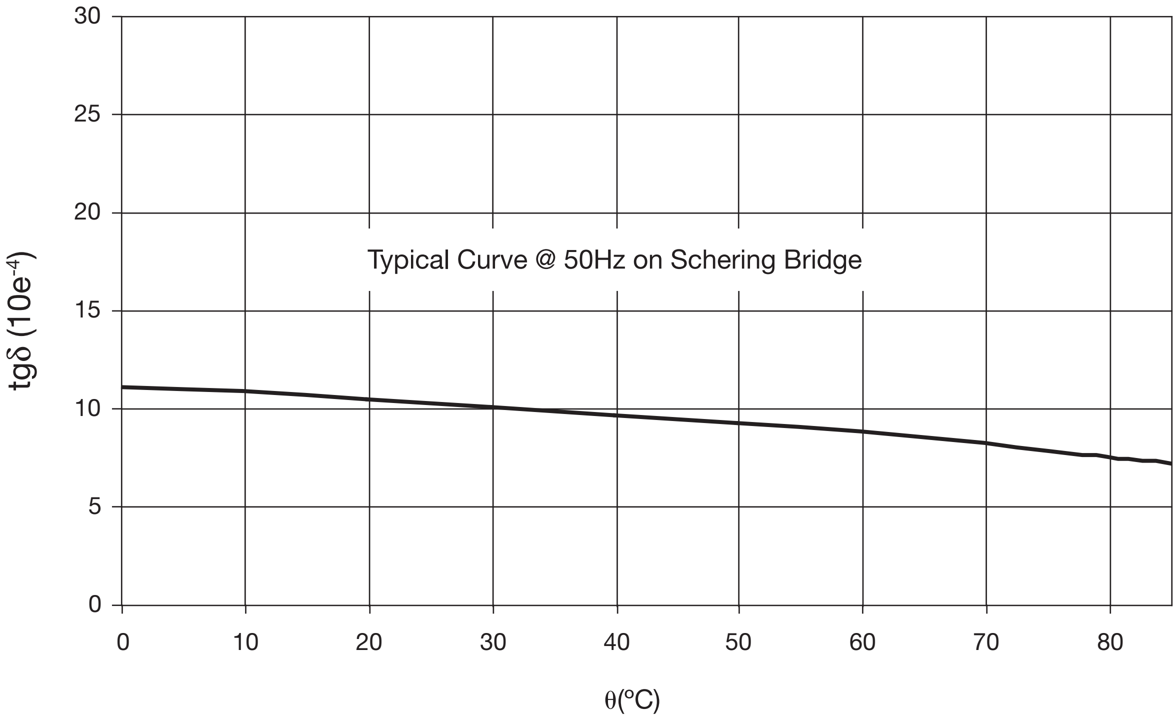
LIFETIME EXPECTANCY VS HOT SPOT TEMPERATURE AND VOLTAGE



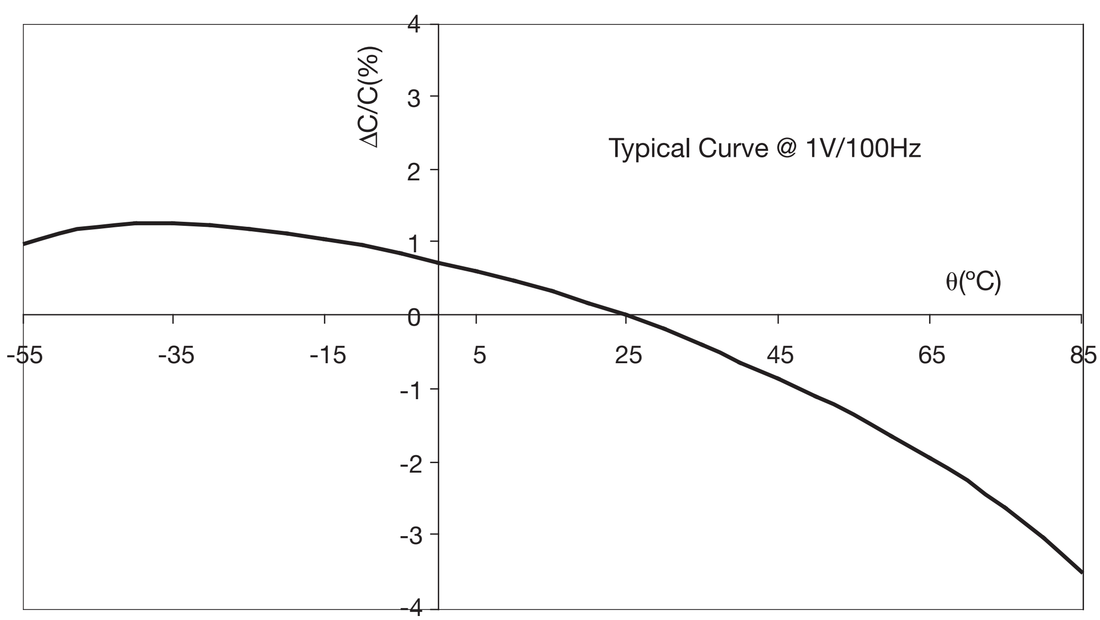
TANGENT OF LOSS ANGLE VS FREQUENCY



TANGENT OF LOSS ANGLE VS TEMPERATURE



ΔC/C VS HOT SPOT TEMPERATURE



General Description

DIMENSIONS

Dimensions are indicated in the value tables as well as the weight.

Dimensional tolerances are:

H ± 3mm, W ± 3mm

Initially, the large faces of the capacitor may be slightly convex. At delivery the maximum width is:

W'max = W +15mm

Standard material is stainless steel. Aluminum is available for specific requirement to reduce the weight or induction effect.

MOUNTING

Vertical mounting is the preferred and horizontal is acceptable. Please contact AVX for up-side down mounting configuration.

HANDLING

When unpacking, it is important that no mechanical shocks occur that might deform the cans and damage the output connection.

The capacitors include, unless otherwise specified, one or several gripping elements (mass screws, jack rings or other hoisting devices); they should be exclusively handled by means of these elements.

In no case should the electrical output terminals be used to lift the capacitor.

The grounding wire should be kept in place until the capacitor is mounted.

ASSEMBLY AND INSTALLATION

To check for the absence of excessive mechanical stresses.

The mechanical stresses in assembly should remain compatible with the characteristics of the capacitor.

The method of mounting should not lead to the deformation of the capacitor case.

Tightening torques are given below:

Output through threaded connections:

max = 25 N-m

Mechanical mounting

Moreover vertical position is the preferential one and horizontal is accepted.

In order to enable air convection, it is necessary to maintain at least 40mm between the large faces of adjacent capacitors.

Connections

They should not induce any force on the output terminals. Flexible connections should be used (braided or thin metal).

The cross section should not be less than:

$S = 0.2 \times I_{max}$ where S (mm^2) and I_{max} (A)

The skin effect, which occurs vs frequency, must also be taken into account.

MARKING

The label is usually located 50mm from the top of the case and centered to the length:

TPC or AVX Logo	Test voltage between terminals and case
Part number	
Capacitance and tolerance	Batch and serial number
Rated voltage in clear	Date of manufacture

SAFETY

The FIM technology provides excellent safety; there is no risk of explosion in case of defect throughout the life of the capacitor. This explains why there is no need to equip these capacitors with pressure switch. Rapeseed oil is not explosive or flammable at normal conditions, therefore capacitors can be transported without being subjected to safety rules. Rapeseed oil flash point is about 317°C and the polypropylene flash point is near 300°C, so the melting certifies a temperature of security above 300°C.

In case of fire above this temperature, it is recommended to use dust or CO_2. The use of water is contra-indicated. The possible rejected products during fire are CO_2, H_2O, CO (in case of non-complete combustion), Hydrocarbons and some other gases. Carrying mask is required for protection.

OIL

The only impregnant used in TRAFIM capacitors is rapeseed oil (otherwise known as Canola oil) and then is fully environmentally compatible. It does not emit toxic or carcinogenic gases, nor is it harmful to soil, water or humans in the event of accidental spillages. As a natural product derived from foodstuff, it is even edible.

Of all the vegetable oils, rapeseed oil has one of the best thermal stabilities and lowest acidity levels.

NON-TOXIC COMPOSITION

Our capacitors are free of:
Arsenic, Asbestos, Beryllium, Brominated flame retardants (PBB and PBDE), Cadmium, CFC, HCFC, Cobalt, Formaldehyde, Halon, Isocyanatos, Mercury, Nickel PCB, PCT, Polyaromatic Hydrocarbons (PAH), Phtalates, PVC, PTFE and Thirams.

Lead is only found in soldering (for approximately 0.3% of the capacitor weight).

Free of SF6.

CALORIFIC VALUE

A formula that gives the calorific value of a standard TRAFIM capacitor is:

$$CV\,(MJ) = L \times [4 \times 10^{-5} \times W \times H - 1.3 \times 10^{-5} \times H + 8 \times 10^{-4} \times W + 4.55 \times 10^{-2}] + 3.75 \times N$$

where H, L, W, are Height, Length and Width in millimeters, and N is the number of terminals.

DESTROYING CAPACITORS

The destruction of the capacitors are subject to the laws in force in each country.

In practice, today, please contact AVX for a list of companies who can take charge of the products to be destroyed.

CAPACITOR DESIGN

The capacitor lifetime depends on the working voltage and the hot spot temperature.

Our caps are designed for 100000 hours lifetime at nominal voltage and 70°C hot spot temperature. According to your operating conditions, you will need to calculate the hot spot temperature, and deduce from this calculation if the lifetime obtained can suit your application.

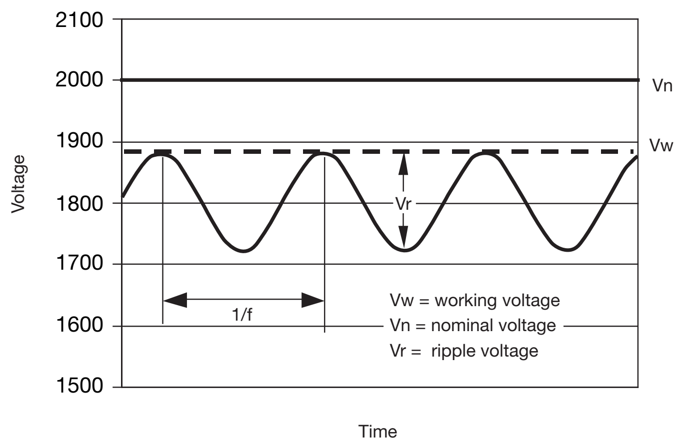
1 According to the tables, you should find a capacitor with required capacitance C_n and voltage V_n with $V_n > V_w$.

Calculate the maximum ripple voltage allowed for the chosen cap and check if $V_r < 0.45 V_n$.

Copy out:

Serial resistance (R_S): see table of values

Thermal resistances Rth1 and Rth2
(depending on cooling conditions):
See page 13 for CAPAFIM
page 16 for TRAFIM
page 24 for FILFIM



2 Hot spot temperature calculation

Total losses are calculated as follow: Pt = Pj + Pd

Joule losses: $Pj = Rs \times I_{rms}^2$

Dielectric losses:

$Pd = Q \times tg\delta_0$ with

- Q = reactive power; $I_{rms}^2 / (C \times 2 \times \pi \times f)$ for a sinusoidal waveform
- $tg\delta_0$ = dielectric losses of polypropylene + rapeseed oil ($tg\delta_0 = 3 \times 10^{-4}$)

Hot spot temperature will be:

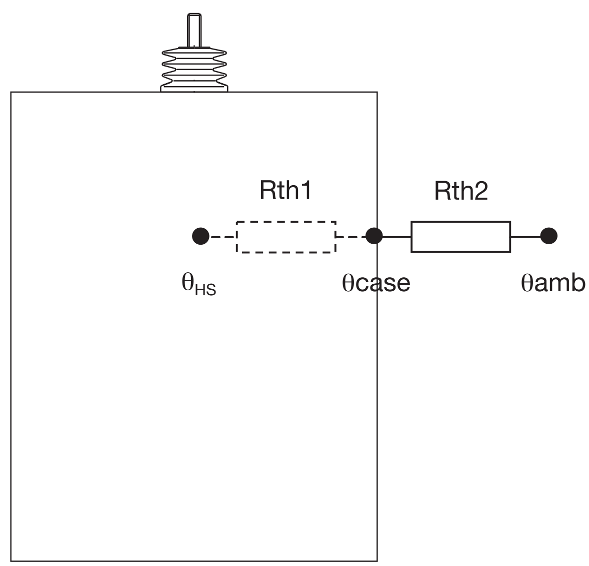
$\theta_{HS} = \theta_{amb} + (Pj + Pd) \times (Rth1 + Rth2)$

θ_{HS} absolute maximum is 85°C

If temperature is higher than 85°C, choose a bigger cap.

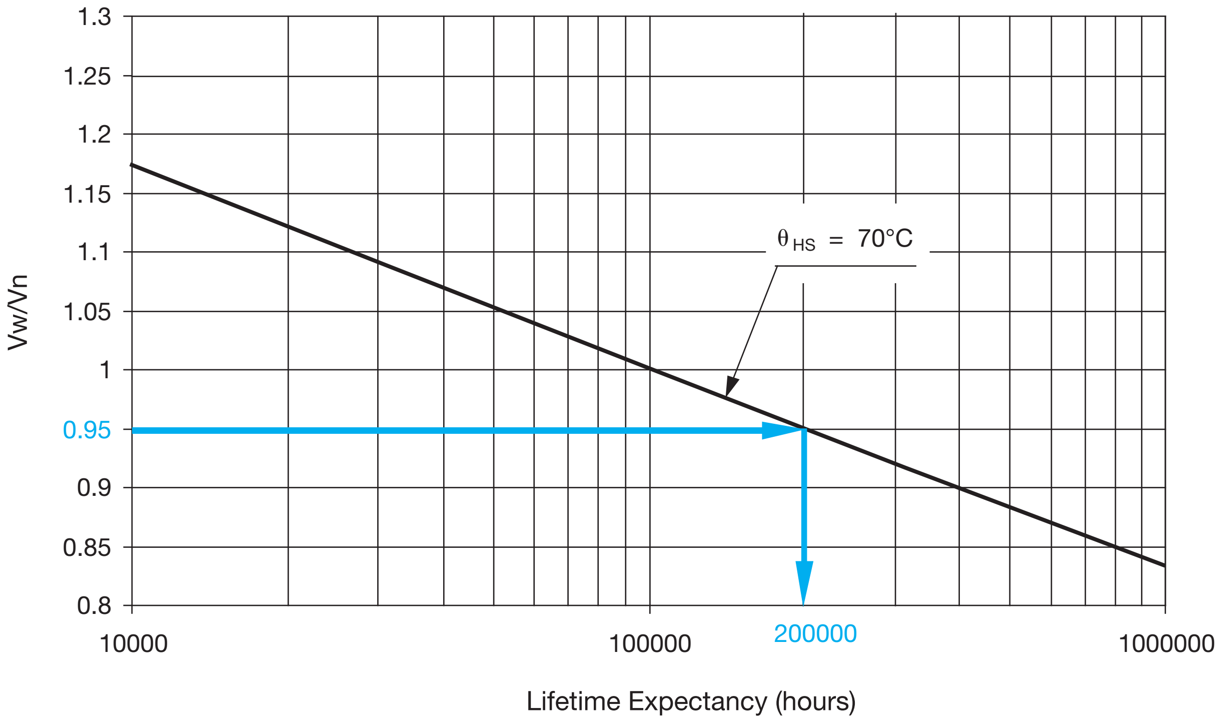
Rth1: Thermal resistance between hot spot and case

Rth2: Thermal resistance between case and ambient air



3 Refer to curve and deduce the lifetime vs V_w/V_n ratio.

LIFETIME EXPECTANCY VS HOT SPOT TEMPERATURE AND VOLTAGE



Ex: nominal voltage 2000V
working voltage 1900V
$\rho = 0.95 \Rightarrow$ lifetime 200000 hours @ 70°C hot spot temperature

You can find a calculation form on page 28 at the end of the catalog.

For any help or specific requirements, please contact your AVX local representative.

MTBF CALCULATION

Based on 20 years of test results, we have established the following relation.

The failure rate λ_B depends on the hot spot temperature θ_{HS} and the charge ratio ρ:

$$\rho = V_w/V_n$$

$$\lambda_B = 3\times10^{5.861\,(\rho - 1)} \times e^{\left[3.98\left[\left(\frac{\theta_{HS}+273}{358}\right)\right]^{30.35}\right]} \times 10^{-9} \text{ in failures/hour}$$

GENERAL FAILURE RATE

$\lambda = \lambda_B \times \pi_Q \times \pi_B \times \pi_E$ failures/hour

π_Q, π_B and π_E see following tables

Qualification	Qualification factor π_Q
Product qualified on IEC 61071 and internal qualification	1
Product qualified on IEC 61071	2
Product answering on another norm	5
Product without qualification	15

Environment	Environment factor π_E
On ground (good conditions)	1
On ground (fixed materials)	2
On ground (on board)	4
On ship	9
On plane	15

Environment	Environment factor π_B
Favorable	1
Unfavorable	5

MEAN TIME BETWEEN FAILURE (MTBF)

M.T.B.F. = $1/\lambda$ hours

SURVIVAL FUNCTION

$N = N_0 \times \exp(-\lambda t)$

N is the number of pieces still working after t hours.

N_0 is the number of pieces at the origin (t=0).

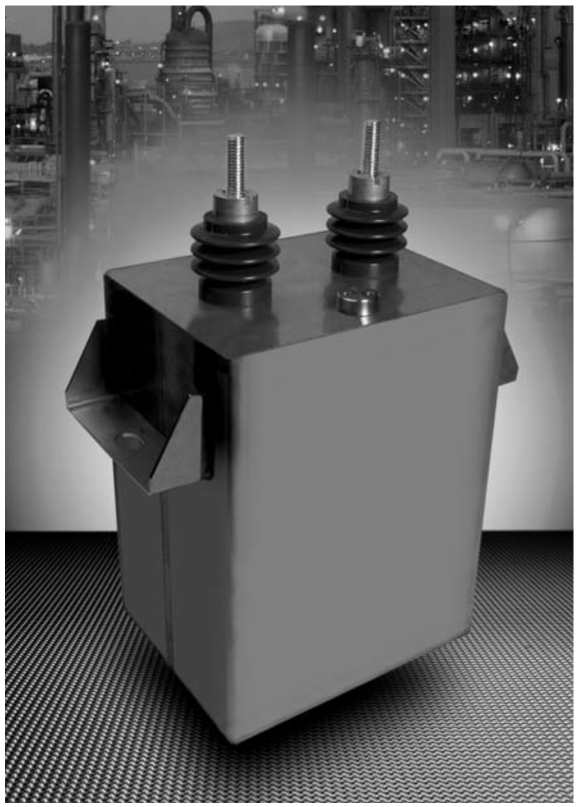
APPLICATIONS

DC voltage filtering for all types of application

PACKAGING

Rectangular non-magnetic stainless steel case.
Grounding is via a nut on the top of the case.

PRESENTATION



ELECTRICAL CHARACTERISTICS

Capacitance range C_n	88µF to 1620µF
Tolerance on C_n	±10%
Nominal DC voltage range	1200V to 3900V
Operating hot-spot temperature range	-55°C to 85°C
Lifetime at V_n and 70°C hot-spot temperature	100,000 hours
Stray inductance	<400nH
Maximum Rms current	see table of values
Test voltage between terminals	$1.5V_n$ during 10s
Test voltage between shorten terminals and case	$6kV_{rms}$ at 50Hz during 10s

CAPAFIM Products

Table of Values

4 sizes and 12 voltages available according to following tables

millimeters (inches)

Type	Length	Width	Height
A	166 (6.535)	70 (2.756)	210 (8.268)
B	166 (6.535)	102 (4.016)	210 (8.268)
C	166 (6.535)	134 (5.276)	210 (8.268)
D	166 (6.535)	166 (6.535)	210 (8.268)

Type	V_n = 1200 to 1400V				V_n = 1800V			
	C (µF)	Rs (mΩ)	Irms max (A)	Part Number	C (µF)	Rs (mΩ)	Irms max (A)	Part Number
A	**650**	3.48	56	DNCFM1K4A0657	**426**	4.35	46	DNCFM1K8A4266
B	**975**	2.6	84	DNCFM1K4B9756	**639**	3.17	69	DNCFM1K8B6396
C	**1300**	1.99	112	DNCFM1K4C1307	**852**	2.43	92	DNCFM1K8C8526
D	**1620**	1.74	140	DNCFM1K4D1627	**1060**	2.09	115	DNCFM1K8D1067

Type	V_n = 2000V				V_n = 2200V			
	C (µF)	Rs (mΩ)	Irms max (A)	Part Number	C (µF)	Rs (mΩ)	Irms max (A)	Part Number
A	**338**	5.33	40	DNCFM2K0A3386	**288**	5.66	36	DNCFM2K2A2886
B	**507**	3.49	60	DNCFM2K0B5076	**432**	3.71	54	DNCFM2K2B4326
C	**676**	2.83	80	DNCFM2K0C6766	**576**	3	72	DNCFM2K2C5766
D	**845**	2.28	100	DNCFM2K0D8456	**720**	2.41	90	DNCFM2K2D0727

Type	V_n = 2400V				V_n = 2600V			
	C (µF)	Rs (mΩ)	Irms max (A)	Part Number	C (µF)	Rs (mΩ)	Irms max (A)	Part Number
A	**228**	6.14	32	DNCFM2K4A2286	**192**	6.49	30	DNCFM2K6A1926
B	**342**	4.03	48	DNCFM2K4B3426	**288**	4.77	45	DNCFM2K6B2886
C	**456**	3.24	64	DNCFM2K4C4566	**384**	3.41	60	DNCFM2K6C3846
D	**570**	2.77	80	DNCFM2K4D0577	**480**	2.91	75	DNCFM2K6D0487

Type	V_n = 2900V				V_n = 3100V			
	C (µF)	Rs (mΩ)	Irms max (A)	Part Number	C (µF)	Rs (mΩ)	Irms max (A)	Part Number
A	**162**	6.83	28	DNCFM2K9A1626	**144**	7.08	26	DNCFM3K1A1446
B	**243**	5	42	DNCFM2K9B2436	**216**	5.16	39	DNCFM3K1B2166
C	**324**	3.58	56	DNCFM2K9C3246	**288**	3.71	52	DNCFM3K1C2886
D	**405**	3.05	70	DNCFM2K9D4056	**360**	3.15	65	DNCFM3K1D0367

CAPAFIM Products

Table of Values

Type	V_n = 3300V				V_n = 3500V			
	C (µF)	Rs (mΩ)	Irms max (A)	Part Number	C (µF)	Rs (mΩ)	Irms max (A)	Part Number
A	**126**	7.35	24	DNCFM3K3A1266	**112**	7.59	22	DNCFM3K5A1126
B	**189**	5.34	36	DNCFM3K3B1896	**168**	5.51	33	DNCFM3K5B1686
C	**252**	3.84	48	DNCFM3K3C2526	**224**	4.47	44	DNCFM3K5C2246
D	**315**	3.25	60	DNCFM3K3D3156	**280**	3.35	55	DNCFM3K5D0287

Type	V_n = 3700V				V_n = 3900V			
	C (µF)	Rs (mΩ)	Irms max (A)	Part Number	C (µF)	Rs (mΩ)	Irms max (A)	Part Number
A	**100**	7,83	20	DNCFM3K7A0107	**88**	8.1	18	DNCFM3K9A0886
B	**150**	5,67	30	DNCFM3K7B0157	**132**	5.98	27	DNCFM3K9B1326
C	**200**	4,59	40	DNCFM3K7C0207	**176**	4.72	36	DNCFM3K9C1766
D	**250**	3,45	50	DNCFM3K7D0257	**220**	4.06	45	DNCFM3K9D0227

THERMAL RESISTANCES

Rth1: Between hot spot and case

Rth2: Between case and ambient air vs convection

Width millimeters (inches)	**Rth1 (°C/W)**	**Rth2 (°C/W)** Natural convection	**Rth2 (°C/W)** Forced air (velocity>2m/s)
70 (2.756)	0.72	0.72	0.36
102 (4.016)	0.62	0.62	0.31
134 (5.276)	0.54	0.54	0.27
166 (6.535)	0.48	0.48	0.24

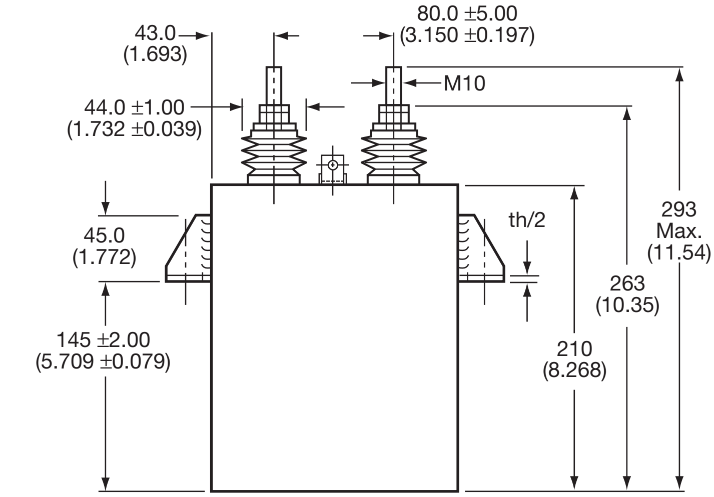
Mechanical Design

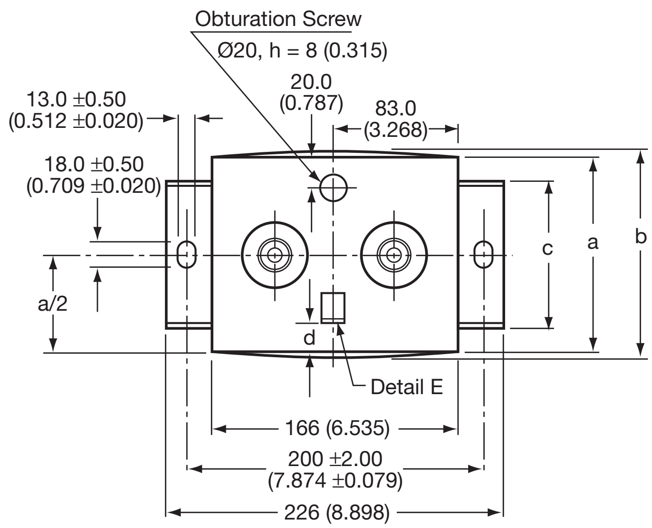
millimeters (inches)

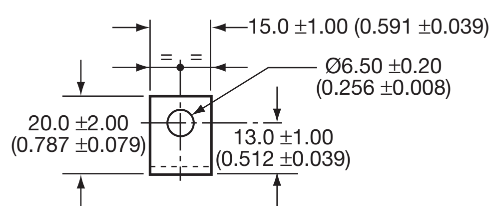
Terminals

Creepage distance
77 (3.031)

Air distance
40 (1.575)







DETAIL E
(for grounding)

Type	a	b	c	d	Weight (kg)
A	70 (2.756)	85 (3.346)	50 (1.969)	10 (0.394)	4.5
B	102 (4.016)	117 (4.606)	50 (1.969)	10 (0.394)	6
C	134 (5.276)	149 (5.866)	100 (3.937)	20 (0.787)	7.5
D	166 (6.535)	181 (7.126)	100 (3.937)	20 (0.787)	9

TRAFIM Products

APPLICATIONS

DC voltage filtering for:

- DC link
- Speed converter (drives and traction)
- Resonant filtering
- Active correction (FACTS)
- Windmills
- Substation

PACKAGING

Rectangular none magnetic stainless steel case.
Grounding is via a nut on the top of the case.

PRESENTATION

ELECTRICAL CHARACTERISTICS

Capacitance range C_n	130µF to 16100µF
Tolerance on C_n	±10%
Nominal DC voltage range	1200V to 6000V
Operating hot-spot temperature	-55ºC to 85°C
Lifetime at V_n and 70°C hot-spot temperature	100,000 hours
Stray inductance	min 40nH at 1MHz
Maximum Rms current	255 Arms
Test voltage between terminals	$1.5V_n$ during 10s
Test voltage between shorten terminals and case	$(2 \times V_n + 1000)V_{rms}$ at 50Hz during 10s

PART NUMBER / HOW TO ORDER

D	K	T	F	M	1	B	M	B	5	8	5	7

Section and Option (1)
1 340x117 2 terminals
2 340x117 4 terminals
3 340x165 2 terminals
4 340x165 4 terminals

Terminal Type (B)
A, B, C or D
See drawings

Fixing (M)
W=without
M=brackets

Voltage (B)
A 1200 to 1500V
B 1850V
C 2000V
D 2250V
E 2500V
F 2750V
G 3000V
H 3500V
I 4000V
J 4500V
K 5000V
L 5500V
M 6000V

Capacitance (5857)
EIA Code

THERMAL RESISTANCES

Rth1: Between hot spot and case

Rth2: Between case and ambient air vs convection

Height millimeters (inches)	Rth1 (°C/W)		Rth2 (°C/W) Natural convection		Rth2 (°C/W) Forced air (velocity>2m/s)	
	Base 340x117	Base 340x165	Base 340x117	Base 340x165	Base 340x117	Base 340x165
215 (8.465)	0.23	0.29	0.34	0.29	0.17	0.15
290 (11.42)	0.17	0.23	0.26	0.23	0.13	0.12
365 (14.37)	0.14	0.19	0.21	0.19	0.11	0.10
440 (17.32)	0.12	0.16	0.18	0.16	0.09	0.08
515 (20.28)	0.10	0.14	0.16	0.14	0.08	0.07
590 (23.23)	0.09	0.12	0.14	0.12	0.07	0.06
705 (27.76)	0.08	0.11	0.12	0.11	0.06	0.06
815 (32.09)	0.07	0.09	0.10	0.09	0.05	0.05

PARASITIC INDUCTANCE VS SIZE

Height millimeters (inches)	Parasitic Inductance L (nH) Measured @ 1MHz							
	Base 340x117				Base 340x165			
	2 Terminals		4 Terminals		2 Terminals		4 Terminals	
	Type A/B	Type C/D	Type A/B	Type C/D	Type A/B	Type C/D	Type A/B	Type C/D
215 (8.465)	69	109	24	34	73	113	28	38
290 (11.42)	72	112	27	37	78	118	33	43
365 (14.37)	75	115	30	40	82	122	37	47
440 (17.32)	78	118	33	43	87	127	42	52
515 (20.28)	81	121	36	46	91	131	46	56
590 (23.23)	84	124	39	49	96	136	51	61
705 (27.76)	89	129	44	54	103	143	58	68
815 (32.09)	93	133	48	58	109	149	64	74

WEIGHT VS SIZE

Height millimeters (inches)	Weight (kg)			
	Base 340x117	Base 340x117	Base 340x165	Base 340x165
	2 terminals	4 terminals	2 terminals	4 terminals
215 (8.465)	14	15	19	20
290 (11.42)	18	19	24	25
365 (14.37)	21.5	22.5	29	30
440 (17.32)	25.5	26.5	34.5	35.5
515 (20.28)	30	31	39.5	40.5
590 (23.23)	34	35	44.5	45.5
705 (27.76)	40	41	52.5	53.5
815 (32.09)	45.5	46.5	60	61

TRAFIM Products

Table of Values

Base 340mm x 117mm (Length x Width)

Height millimeters (inches)	V_n = 1200 to 1500V			V_n = 1850V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**1900**	0.60	DKTFMXXXA1907	**1420**	0.64	DKTFMXXXB1427
290 (11.42)	**2850**	0.48	DKTFMXXXA2857	**2140**	0.49	DKTFMXXXB2147
365 (14.37)	**3800**	0.42	DKTFMXXXA3807	**2850**	0.42	DKTFMXXXB2857
440 (17.32)	**4750**	0.39	DKTFMXXXA4757	**3560**	0.38	DKTFMXXXB3567
515 (20.28)	**5700**	0.37	DKTFMXXXA5707	**4270**	0.36	DKTFMXXXB4277
590 (23.23)	**6750**	0.36	DKTFMXXXA6757	**4980**	0.35	DKTFMXXXB4987
705 (27.76)	**8100**	0.35	DKTFMXXXA8107	**6050**	0.33	DKTFMXXXB6057
815 (32.09)	**9500**	0.34	DKTFMXXXA9507	**7120**	0.32	DKTFMXXXB7127

Height millimeters (inches)	V_n = 2000V			V_n = 2250V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**1260**	0.67	DKTFMXXXC1267	**1000**	0.73	DKTFMXXXD1007
290 (11.42)	**1880**	0.51	DKTFMXXXC1887	**1500**	0.55	DKTFMXXXD1507
365 (14.37)	**2510**	0.44	DKTFMXXXC2517	**2000**	0.47	DKTFMXXXD2007
440 (17.32)	**3140**	0.40	DKTFMXXXC3147	**2500**	0.42	DKTFMXXXD2507
515 (20.28)	**3770**	0.37	DKTFMXXXC3777	**3000**	0.39	DKTFMXXXD3007
590 (23.23)	**4400**	0.36	DKTFMXXXC4407	**3500**	0.37	DKTFMXXXD3507
705 (27.76)	**5340**	0.34	DKTFMXXXC5347	**4250**	0.36	DKTFMXXXD4257
815 (32.09)	**6280**	0.33	DKTFMXXXC6287	**5000**	0.35	DKTFMXXXD5007

Height millimeters (inches)	V_n = 2500V			V_n = 2750V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**810**	0.79	DKTFMXXXE0817	**675**	0.86	DKTFMXXXF6756
290 (11.42)	**1220**	0.60	DKTFMXXXE1227	**1010**	0.64	DKTFMXXXF1017
365 (14.37)	**1620**	0.50	DKTFMXXXE1627	**1350**	0.53	DKTFMXXXF1357
440 (17.32)	**2030**	0.44	DKTFMXXXE2037	**1680**	0.47	DKTFMXXXF1687
515 (20.28)	**2440**	0.41	DKTFMXXXE2447	**2020**	0.44	DKTFMXXXF2027
590 (23.23)	**2840**	0.39	DKTFMXXXE2847	**2360**	0.41	DKTFMXXXF2367
705 (27.76)	**3450**	0.37	DKTFMXXXE3457	**2860**	0.39	DKTFMXXXF2867
815 (32.09)	**4060**	0.36	DKTFMXXXE4067	**3370**	0.37	DKTFMXXXF3377

Height millimeters (inches)	V_n = 3000V			V_n = 3500V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**570**	0.92	DKTFMXXXG0577	**365**	0.62	DKTFMXXXH3656
290 (11.42)	**850**	0.68	DKTFMXXXG0857	**545**	0.48	DKTFMXXXH5456
365 (14.37)	**1140**	0.56	DKTFMXXXG1147	**730**	0.41	DKTFMXXXH0737
440 (17.32)	**1420**	0.50	DKTFMXXXG1427	**910**	0.38	DKTFMXXXH0917
515 (20.28)	**1700**	0.46	DKTFMXXXG1707	**1090**	0.35	DKTFMXXXH1097
590 (23.23)	**1990**	0.43	DKTFMXXXG1997	**1280**	0.34	DKTFMXXXH1287
705 (27.76)	**2410**	0.40	DKTFMXXXG2417	**1550**	0.33	DKTFMXXXH1557
815 (32.09)	**2840**	0.39	DKTFMXXXG2847	**1820**	0.32	DKTFMXXXH1827

Base 340mm x 117mm (Length x Width)

Height millimeters (inches)	V_n = 4000V			V_n = 4500V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**280**	0.68	DKTFMXXXI0287	**225**	0.74	DKTFMXXXJ2256
290 (11.42)	**425**	0.52	DKTFMXXXI4256	**335**	0.56	DKTFMXXXJ3356
365 (14.37)	**565**	0.44	DKTFMXXXI5656	**445**	0.48	DKTFMXXXJ4456
440 (17.32)	**705**	0.40	DKTFMXXXI7056	**560**	0.43	DKTFMXXXJ0567
515 (20.28)	**845**	0.38	DKTFMXXXI8456	**670**	0.40	DKTFMXXXJ0677
590 (23.23)	**985**	0.36	DKTFMXXXI9856	**780**	0.38	DKTFMXXXJ0787
705 (27.76)	**1200**	0.34	DKTFMXXXI1207	**950**	0.36	DKTFMXXXJ0957
815 (32.09)	**1410**	0.33	DKTFMXXXI1417	**1120**	0.35	DKTFMXXXJ1127

Height millimeters (inches)	V_n = 5000V			V_n = 5500V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**180**	0.80	DKTFMXXXK0187	**150**	0.86	DKTFMXXXL0157
290 (11.42)	**275**	0.60	DKTFMXXXK2756	**225**	0.65	DKTFMXXXL2256
365 (14.37)	**365**	0.51	DKTFMXXXK3656	**300**	0.54	DKTFMXXXL0307
440 (17.32)	**455**	0.45	DKTFMXXXK4556	**375**	0.48	DKTFMXXXL3756
515 (20.28)	**545**	0.42	DKTFMXXXK5456	**450**	0.44	DKTFMXXXL0457
590 (23.23)	**635**	0.40	DKTFMXXXK6356	**530**	0.41	DKTFMXXXL0537
705 (27.76)	**775**	0.37	DKTFMXXXK7756	**640**	0.39	DKTFMXXXL0647
815 (32.09)	**910**	0.36	DKTFMXXXK0917	**755**	0.38	DKTFMXXXL7556

Height millimeters (inches)	V_n = 6000V		
	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**130**	0.93	DKTFMXXXM0137
290 (11.42)	**190**	0.69	DKTFMXXXM0197
365 (14.37)	**255**	0.57	DKTFMXXXM2556
440 (17.32)	**320**	0.50	DKTFMXXXM0327
515 (20.28)	**380**	0.46	DKTFMXXXM0387
590 (23.23)	**445**	0.43	DKTFMXXXM4456
705 (27.76)	**540**	0.41	DKTFMXXXM0547
815 (32.09)	**635**	0.39	DKTFMXXXM6356

Table of Values

Base 340mm x 165mm (Length x Width)

Height millimeters (inches)	V_n = 1200 to 1500V			V_n = 1850V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**3100**	0.78	DKTFMXXXA3107	**2110**	0.92	DKTFMXXXB2117
290 (11.42)	**4630**	0.60	DKTFMXXXA4637	**3170**	0.69	DKTFMXXXB3177
365 (14.37)	**6200**	0.52	DKTFMXXXA6207	**4230**	0.58	DKTFMXXXB4237
440 (17.32)	**7700**	0.47	DKTFMXXXA7707	**5290**	0.52	DKTFMXXXB5297
515 (20.28)	**9300**	0.44	DKTFMXXXA9307	**6340**	0.48	DKTFMXXXB6347
590 (23.23)	**10800**	0.42	DKTFMXXXA1088	**7400**	0.46	DKTFMXXXB7407
705 (27.76)	**13200**	0.40	DKTFMXXXA1328	**8980**	0.43	DKTFMXXXB8987
815 (32.09)	**15500**	0.39	DKTFMXXXA1558	**10600**	0.42	DKTFMXXXB1068

Height millimeters (inches)	V_n = 2000V			V_n = 2250V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**1680**	1.00	DKTFMXXXC1687	**1420**	1.08	DKTFMXXXD1427
290 (11.42)	**2520**	0.75	DKTFMXXXC2527	**2140**	0.80	DKTFMXXXD2147
365 (14.37)	**3360**	0.63	DKTFMXXXC3367	**2850**	0.66	DKTFMXXXD2857
440 (17.32)	**4200**	0.56	DKTFMXXXC4207	**3570**	0.58	DKTFMXXXD3577
515 (20.28)	**5040**	0.51	DKTFMXXXC5047	**4280**	0.53	DKTFMXXXD4287
590 (23.23)	**5880**	0.48	DKTFMXXXC5887	**5000**	0.50	DKTFMXXXD5007
705 (27.76)	**7140**	0.45	DKTFMXXXC7147	**6070**	0.47	DKTFMXXXD6077
815 (32.09)	**8400**	0.44	DKTFMXXXC8407	**7140**	0.45	DKTFMXXXD7147

Height millimeters (inches)	V_n = 2500V			V_n = 2750V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**1130**	1.18	DKTFMXXXE1137	**955**	1.27	DKTFMXXXF9556
290 (11.42)	**1700**	0.87	DKTFMXXXE1707	**1430**	0.93	DKTFMXXXF1437
365 (14.37)	**2260**	0.71	DKTFMXXXE2267	**1910**	0.76	DKTFMXXXF1917
440 (17.32)	**2830**	0.63	DKTFMXXXE2837	**2380**	0.66	DKTFMXXXF2387
515 (20.28)	**3400**	0.57	DKTFMXXXE3407	**2860**	0.60	DKTFMXXXF2867
590 (23.23)	**3950**	0.53	DKTFMXXXE3957	**3340**	0.56	DKTFMXXXF3347
705 (27.76)	**4820**	0.49	DKTFMXXXE4827	**4060**	0.52	DKTFMXXXF4067
815 (32.09)	**5670**	0.47	DKTFMXXXE5677	**4770**	0.49	DKTFMXXXF4777

Height millimeters (inches)	V_n = 3000V			V_n = 3500V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**800**	1.37	DKTFMXXXG0807*	**555**	1.60	DKTFMXXXH5556*
290 (11.42)	**1200**	0.99	DKTFMXXXG1207	**833**	1.15	DKTFMXXXH8336
365 (14.37)	**1600**	0.81	DKTFMXXXG1607	**1110**	0.92	DKTFMXXXH1117
440 (17.32)	**2000**	0.70	DKTFMXXXG2007	**1390**	0.79	DKTFMXXXH1397
515 (20.28)	**2400**	0.63	DKTFMXXXG2407	**1660**	0.71	DKTFMXXXH1667
590 (23.23)	**2800**	0.59	DKTFMXXXG2807	**1940**	0.65	DKTFMXXXH1947
705 (27.76)	**3400**	0.54	DKTFMXXXG3407	**2360**	0.59	DKTFMXXXH2367
815 (32.09)	**4000**	0.51	DKTFMXXXG4007	**2780**	0.56	DKTFMXXXH2787

* see particular Rms current value on page 20

TRAFIM Products

Table of Values

Base 340mm x 165mm (Length x Width)

Height millimeters (inches)	V_n = 4000V			V_n = 4500V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**438**	1.78	DKTFMXXXI4386*	**335**	1.08	DKTFMXXXJ3356
290 (11.42)	**657**	1.26	DKTFMXXXI6576	**503**	0.80	DKTFMXXXJ5036
365 (14.37)	**876**	1.00	DKTFMXXXI8766	**670**	0.67	DKTFMXXXJ0677
440 (17.32)	**1090**	0.87	DKTFMXXXI1097	**839**	0.59	DKTFMXXXJ8396
515 (20.28)	**1310**	0.77	DKTFMXXXI1317	**1000**	0.54	DKTFMXXXJ1007
590 (23.23)	**1530**	0.70	DKTFMXXXI1537	**1170**	0.50	DKTFMXXXJ1177
705 (27.76)	**1860**	0.64	DKTFMXXXI1867	**1420**	0.47	DKTFMXXXJ1427
815 (32.09)	**2190**	0.59	DKTFMXXXI2197	**1680**	0.45	DKTFMXXXJ1687

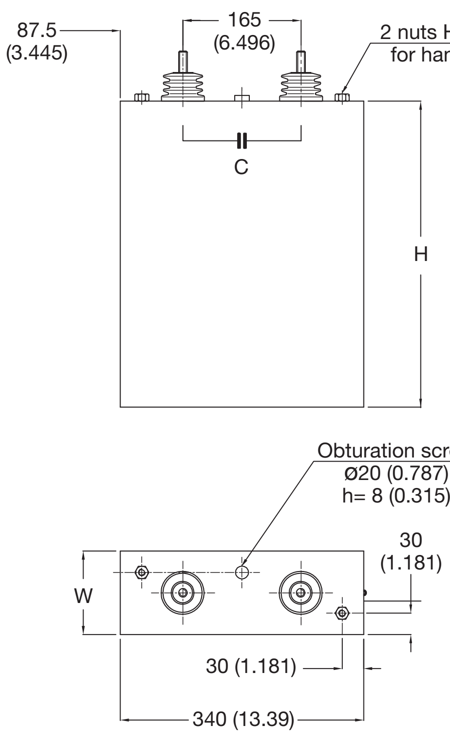
Height millimeters (inches)	V_n = 5000V			V_n = 5500V		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**266**	1.19	DKTFMXXXK2666	**224**	1.28	DKTFMXXXL2246
290 (11.42)	**400**	0.87	DKTFMXXXK0407	**336**	0.93	DKTFMXXXL3366
365 (14.37)	**532**	0.72	DKTFMXXXK5326	**448**	0.76	DKTFMXXXL4486
440 (17.32)	**666**	0.63	DKTFMXXXK6666	**560**	0.67	DKTFMXXXL0567
515 (20.28)	**800**	0.57	DKTFMXXXK0807	**672**	0.60	DKTFMXXXL6726
590 (23.23)	**932**	0.53	DKTFMXXXK9326	**785**	0.56	DKTFMXXXL7856
705 (27.76)	**1130**	0.50	DKTFMXXXK1137	**953**	0.52	DKTFMXXXL9536
815 (32.09)	**1330**	0.47	DKTFMXXXK1337	**1120**	0.49	DKTFMXXXL1127

Height millimeters (inches)	V_n = 6000V		
	C (µF)	Rs (mΩ)	Part Number
215 (8.465)	**188**	1.38	DKTFMXXXM1886*
290 (11.42)	**282**	1.00	DKTFMXXXM2826
365 (14.37)	**376**	0.81	DKTFMXXXM3766
440 (17.32)	**470**	0.70	DKTFMXXXM0477
515 (20.28)	**564**	0.64	DKTFMXXXM5646
590 (23.23)	**659**	0.59	DKTFMXXXM6596
705 (27.76)	**800**	0.54	DKTFMXXXM0807
815 (32.09)	**940**	0.51	DKTFMXXXM0947

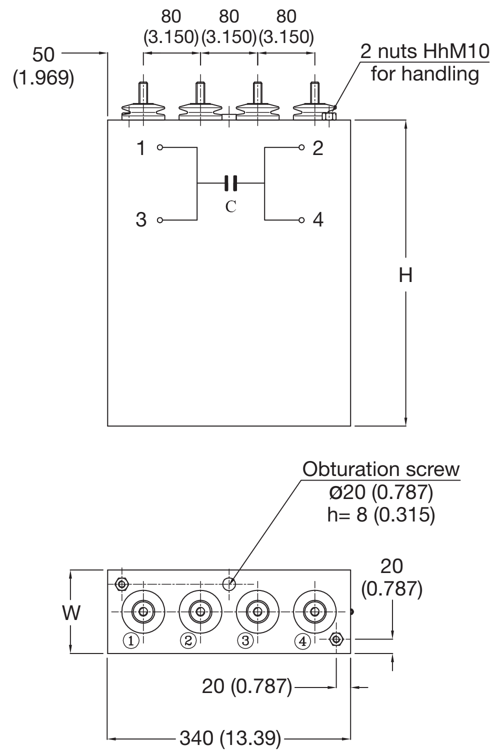
* see particular Rms current value

Particular Rms Current Value	
Part Number	**I_{rms} max (A)**
DKTFMXXXG0807	244
DKTFMXXXH5556	204
DKTFMXXXI4386	181
DKTFMXXXM1886	244

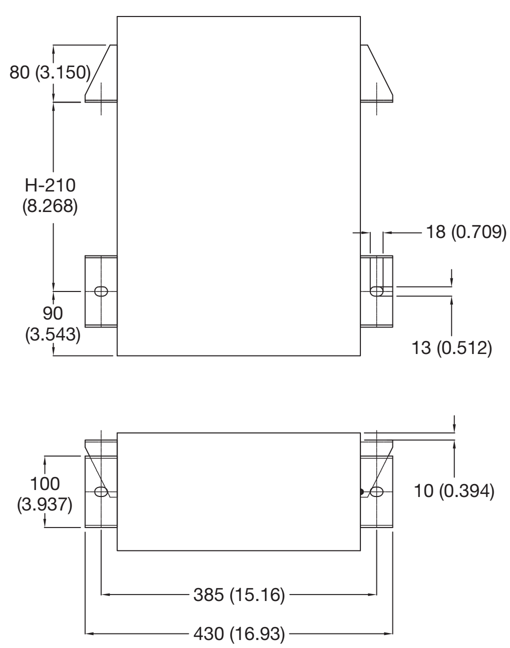
Standard Design



Low Inductance Option



Mounting Brackets (suggested) Lower Brackets Removed for H < 500 mm



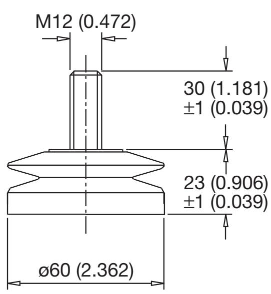
Terminals and Connections

Epoxide terminals assembled by O-ring
Other specific connections on request

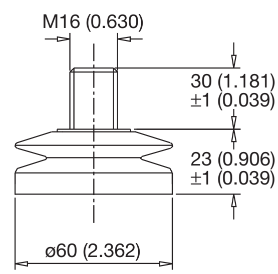
millimeters (inches)

Type	Creepage distance	Air distance
Type A / Type B	52 (2.047)	30 (1.181)
Type C / Type D	84 (3.307)	50 (1.969)

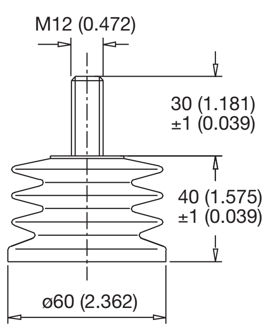
Type A



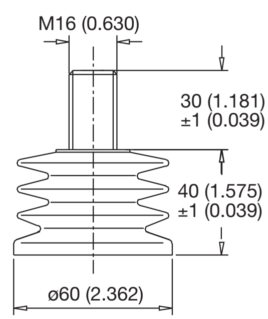
Type B



Type C



Type D



Other terminals types are available on request.

FILFIM Products

APPLICATIONS

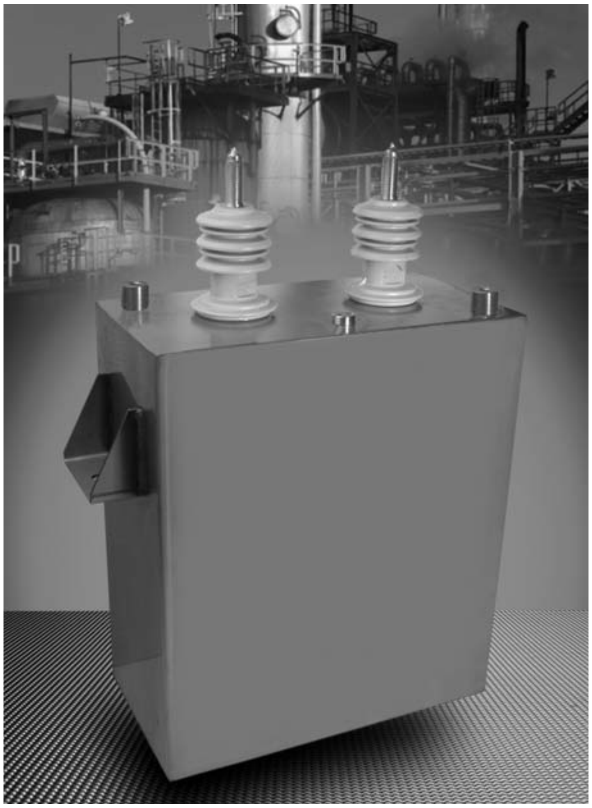
DC voltage filtering for:

- DC link
- Resonant filtering
- Active correction *(FACTS)*
- HVDC
- High Power DC Supply

PACKAGING

Rectangular stainless steel case.
Grounding is via a nut on top of the case.

PRESENTATION



ELECTRICAL CHARACTERISTICS

Capacitance range C_n	2.6µF to 612µF
Tolerance on C_n	±10%
Nominal DC voltage range	6500V to 56kV (up to 100kV on specific design)
Operating hot-spot temperature range	-55ºC to 85°C
Lifetime @ V_n and 70°C hot-spot temperature	100,000 hours
Test voltage between terminals	$1.5V_n$ during 10s
Test voltage between shorten terminals and case	$1.5V_n$ during 10s

PART NUMBER / HOW TO ORDER

D	L	I	F	M	1	A	M	A	1	8	8	6

Section and Option
1 350x185 1 terminal
2 350x185 2 terminals
3 520x185 1 terminal
4 520x185 2 terminals
5 695x185 1 terminal
6 695x185 2 terminals

Terminal Type
A, B or C
See drawings

Fixing
W=without
M=brackets

Voltage

A 6500V	F 14500V	K 28000V
B 7900V	G 15800V	L 32000V
C 9000V	H 18000V	M 36000V
D 10500V	I 22000V	N 42000V
E 12000V	J 26000V	O 56000V

Capacitance
EIA Code

THERMAL RESISTANCE

Rth1: Between hot spot and case

Rth2: Between case and ambient air vs convection

Height (mm) millimeters (inches)	**Rth1 (°C/W)**			**Rth2 (°C/W)** Natural convection			**Rth2 (°C/W)** Forced air (velocity>2m/s)		
	Base 350x185	**Base 520x185**	**Base 695x185**	**Base 350x185**	**Base 520x185**	**Base 695x185**	**Base 350x185**	**Base 520x185**	**Base 695x185**
315 (12.40)	0.2	0.15	0.115	0.2	0.15	0.115	0.1	0.075	0.058
410 (16.14)	0.16	0.12	0.095	0.16	0.12	0.095	0.08	0.06	0.048
500 (19.69)	0.14	0.1	0.08	0.14	0.1	0.08	0.07	0.05	0.04
595 (23.43)	0.12	0.085	0.07	0.12	0.085	0.07	0.06	0.043	0.035
685 (26.97)	0.1	0.075	0.06	0.1	0.075	0.06	0.05	0.038	0.03
770 (30.31)	0.09	0.07	0.055	0.09	0.07	0.055	0.045	0.035	0.028

PARASITIC INDUCTANCE

Ls (nH) = 0.332 x H (mm) + $L_{terminals}$

WEIGHT VS SIZE

Height millimeters (inches)	**Weight (kg)**		
	Base 350x185	**Base 520x185**	**Base 695x185**
315 (12.40)	29	41	54
410 (16.14)	36	52	68
500 (19.69)	43	62	81
595 (23.43)	50	72	95
685 (26.97)	57	82	108
770 (30.31)	63	91	119

FILFIM Products

Table of Values

Height millimeters (inches)	Terminal Type A — V_n = 6500V Base 350x185 (Length x Width)			Terminal Type A — V_n = 7900V Base 350x185 (Length x Width)		
	C (µF)	**Rs (mΩ)**	**Part Number**	**C (µF)**	**Rs (mΩ)**	**Part Number**
315 (12.40)	**188**	3.4	DLIFMXAXA1886	**126**	3.6	DLIFMXAXB1266
410 (16.14)	**275**	3.3	DLIFMXAXA2756	**184**	3.4	DLIFMXAXB1846
500 (19.69)	**362**	3.2	DLIFMXAXA3626	**242**	3.3	DLIFMXAXB2426
595 (23.43)	**450**	3.2	DLIFMXAXA0457	**300**	3.2	DLIFMXAXB0307
685 (26.97)	**537**	3.1	DLIFMXAXA5376	**359**	3.2	DLIFMXAXB3596
770 (30.31)	**612**	3.1	DLIFMXAXA6126	**410**	3.2	DLIFMXAXB0417

Height millimeters (inches)	Terminal Type A — V_n = 9000V Base 350x185 (Length x Width)			Terminal Type A — V_n = 10500V Base 350x185 (Length x Width)		
	C (µF)	**Rs (mΩ)**	**Part Number**	**C (µF)**	**Rs (mΩ)**	**Part Number**
315 (12.40)	**95**	3.7	DLIFMXAXC0956	**73**	5.8	DLIFMXAXD0736
410 (16.14)	**138**	3.4	DLIFMXAXC1386	**107**	5	DLIFMXAXD1076
500 (19.69)	**181**	3.3	DLIFMXAXC1816	**140**	4.6	DLIFMXAXD0147
595 (23.43)	**225**	3.3	DLIFMXAXC2256	**174**	4.4	DLIFMXAXD1746
685 (26.97)	**269**	3.2	DLIFMXAXC2696	**208**	4.3	DLIFMXAXD2086
770 (30.31)	**307**	3.2	DLIFMXAXC3076	**237**	4.3	DLIFMXAXD2376

Height millimeters (inches)	Terminal Type A — V_n = 12000V Base 350x185 (Length x Width)			Terminal Type A — V_n = 14500V Base 350x185 (Length x Width)		
	C (µF)	**Rs (mΩ)**	**Part Number**	**C (µF)**	**Rs (mΩ)**	**Part Number**
315 (12.40)	**55**	6.2	DLIFMXAXE0556	**37.5**	5.6	DLIFMXAXF3755
410 (16.14)	**80**	5.3	DLIFMXAXE0806	**55**	4.9	DLIFMXAXF0556
500 (19.69)	**105**	4.9	DLIFMXAXE1056	**72**	4.6	DLIFMXAXF0726
595 (23.43)	**130**	4.6	DLIFMXAXE0137	**89**	4.4	DLIFMXAXF0896
685 (26.97)	**155**	4.5	DLIFMXAXE1556	**106**	4.3	DLIFMXAXF1066
770 (30.31)	**177**	4.4	DLIFMXAXE1776	**121**	4.2	DLIFMXAXF1216

Height millimeters (inches)	Terminal Type A — V_n = 15800V Base 350x185 (Length x Width)			Terminal Type B — V_n = 18000V Base 350x185 (Length x Width)		
	C (µF)	**Rs (mΩ)**	**Part Number**	**C (µF)**	**Rs (mΩ)**	**Part Number**
315 (12.40)	**31.5**	5.9	DLIFMXAXG3155	**19.5**	7.8	DLIFMXBXH1955
410 (16.14)	**46**	5.1	DLIFMXAXG0466	**30**	6.5	DLIFMXBXH0306
500 (19.49)	**60.5**	4.7	DLIFMXAXG6055	**45**	5.9	DLIFMXBXH0456
595 (23.43)	**75**	4.5	DLIFMXAXG0756	**51**	5.6	DLIFMXBXH0516
685 (26.97)	**89**	4.4	DLIFMXAXG0896	**62**	5.4	DLIFMXBXH0626
770 (30.31)	**102**	4.3	DLIFMXAXG1026	**72**	5.3	DLIFMXBXH0726

FILFIM Products

Table of Values

Height millimeters (inches)	V_n = 22000V Terminal Type B Base 520x185 (Length x Width)			V_n = 26000V Terminal Type B Base 520x185 (Length x Width)		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
315 (12.40)	**20**	8.9	DLIFMXBXI0206	**14.2**	9.8	DLIFMXBXJ1425
410 (16.14)	**31.5**	7.2	DLIFMXBXI3155	**22.5**	7.8	DLIFMXBXJ2255
500 (19.69)	**42.5**	6.6	DLIFMXBXI4255	**30**	7	DLIFMXBXJ0306
595 (23.43)	**54**	6.2	DLIFMXBXI0546	**38**	6.6	DLIFMXBXJ0386
685 (26.97)	**65**	6	DLIFMXBXI0656	**46**	6.3	DLIFMXBXJ0466
770 (30.31)	**75**	5.9	DLIFMXBXI0756	**53**	6.2	DLIFMXBXJ0536

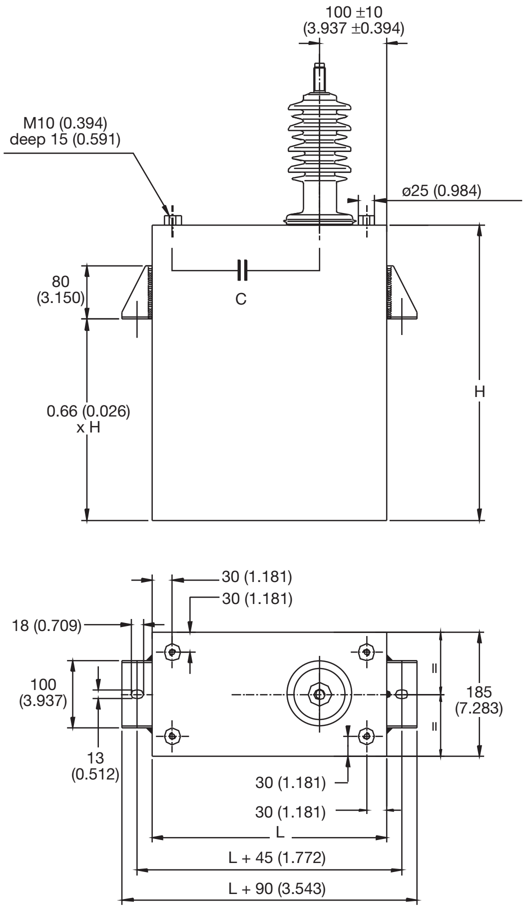
Height millimeters (inches)	V_n = 28000V Terminal Type B Base 350x185 (Length x Width)			V_n = 32000V Terminal Type B Base 695x185 (Length x Width)		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
315 (12.40)	**5.8**	6.8	DLIFMXBXK0585	**12.8**	11.2	DLIFMXBXL1285
410 (16.14)	**9**	5.9	DLIFMXBXK0905	**20**	8.8	DLIFMXBXL0206
500 (19.69)	**12**	5.5	DLIFMXBXK0126	**27**	7.9	DLIFMXBXL0276
595 (23.43)	**15.5**	5.2	DLIFMXBXK1555	**34**	7.4	DLIFMXBXL0346
685 (26.97)	**18.3**	5.1	DLIFMXBXK1835	**41**	7.1	DLIFMXBXL0416
770 (30.31)	**21.5**	5.1	DLIFMXBXK2155	**47**	6.9	DLIFMXBXL0476

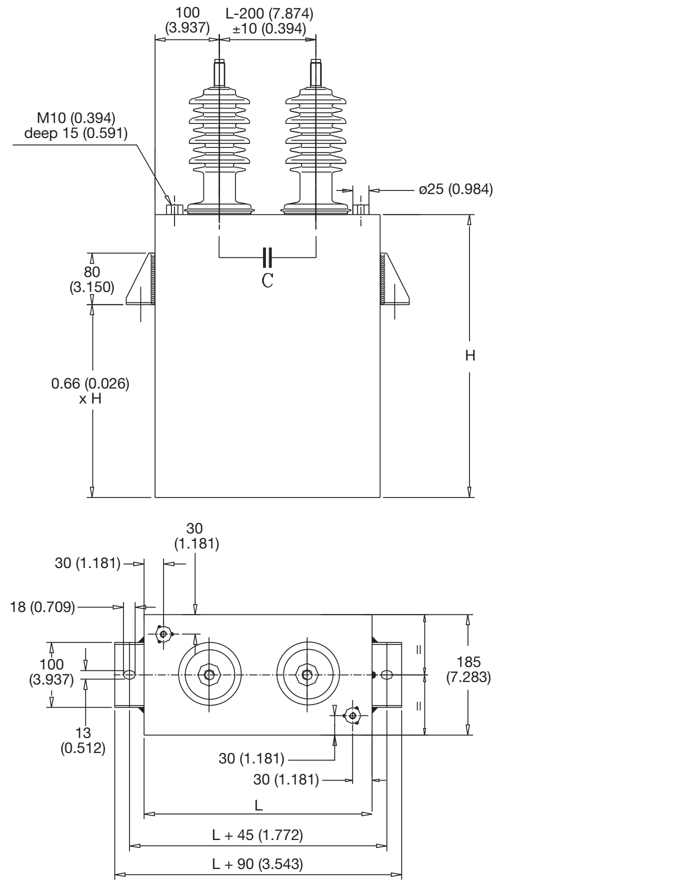
Height millimeters (inches)	V_n = 36000V Terminal Type C Base 695x185 (Length x Width)			V_n = 42000V Terminal Type C Base 520x185 (Length x Width)		
	C (µF)	Rs (mΩ)	Part Number	C (µF)	Rs (mΩ)	Part Number
315 (12.40)	**9**	13.5	DLIFMXCXM0905	**3.5**	5.5	DLIFMXCXN0355
410 (16.14)	**14.2**	10.5	DLIFMXCXM1425	**5.6**	8	DLIFMXCXN0565
500 (19.69)	**19.3**	9.3	DLIFMXCXM1935	**7.7**	7.2	DLIFMXCXN0775
595 (23.43)	**24.8**	8.6	DLIFMXCXM2485	**9.8**	6.9	DLIFMXCXN0985
685 (26.97)	**30**	8.2	DLIFMXCXM0306	**12**	6.7	DLIFMXCXN0126
770 (30.31)	**35.5**	7.9	DLIFMXCXM3555	**14**	6.6	DLIFMXCXN0146

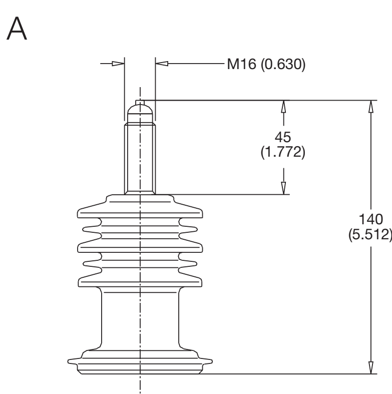
Height millimeters (inches)	V_n = 56000V Terminal Type C Base 695x185 (Length x Width))		
	C (µF)	Rs (mΩ)	Part Number
315 (12.40)	**2.6**	11.6	DLIFMXCXO0265
410 (16.14)	**4.2**	9.2	DLIFMXCXO0425
500 (19.69)	**5.7**	8.3	DLIFMXCXO0575
595 (23.43)	**7.3**	7.8	DLIFMXCXO0735
685 (26.97)	**8.8**	7.5	DLIFMXCXO0885
770 (30.31)	**10.3**	7.4	DLIFMXCXO1035

FILFIM Products

Mechanical Design



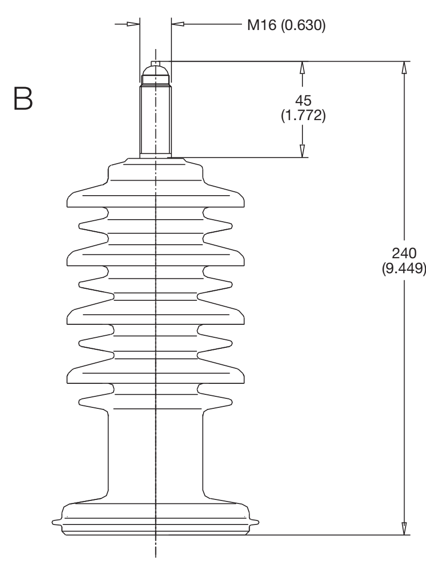




Creepage distance 195 (7.677)
Air distance 93 (3.661)

$L_{terminal}$ = 140nH

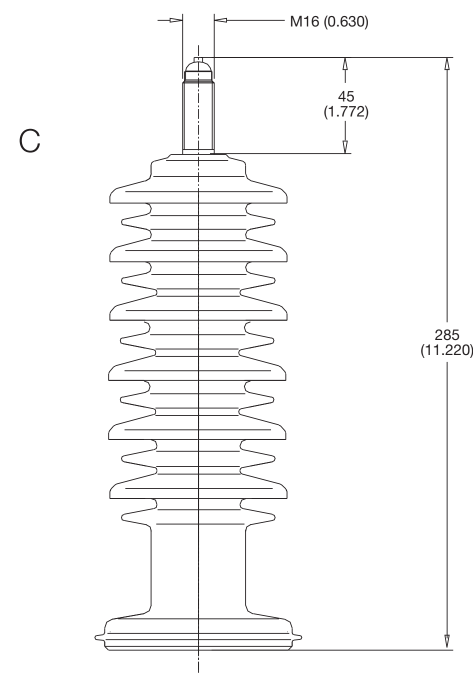
Un≤16kV



Creepage distance 440 (17.323)
Air distance 191 (7.520)

$L_{terminal}$ = 240nH

16kV<Un≤32kV



Creepage distance 615 (24.213)
Air distance 239 (9.409)

$L_{terminal}$ = 285nH

32kV<Un≤56kV

DESIGN

Specification

Capacitance	C (µF)	
Working voltage	V_w (V)	
Rms current	I_{rms} (A_{rms})	
Frequency	F (Hz)	
Ripple voltage	V_r (V)	
Ambient temperature	θ_{amb} (°C)	
Lifetime @ V_w,I_{rms} and θ_{amb}	hours	
Parasitic inductance	L (nH)	
Cooling conditions		

Your Choice

PN		
Capacitance	C (µF)	
Nominal voltage	V_n (V)	
Serial resistance	Rs (mΩ)	
Thermal resistance between hot spot and case	Rth1 (°C/W)	
Thermal resistance between case and ambient air	Rth2 (°C/W)	

Calculations

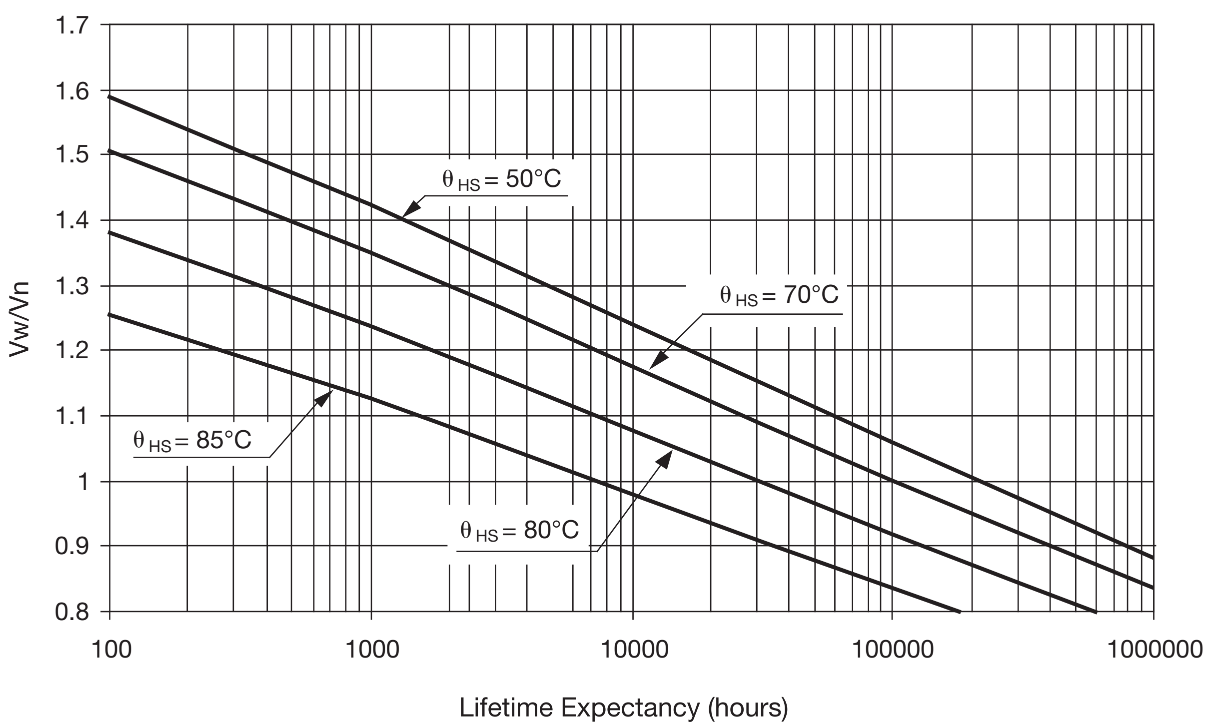
Maximum ripple voltage	V_{rmax}=0.45V_n	V_r = V

The maximum ripple voltage must be in any case lower than the ripple voltage

Ratio V_w/V_n	$\rho = V_w/V_n$	ρ =
Joule losses	Pj = Rs x I_{rms}^2	Pj = W
Dielectric losses	Pd = Q x tgδ_0 = Q x 3.10^{-4}	Pd = W
Hot spot temperature	$\theta_{HS} = \theta_{amb}$ + (Pj+Pd) x (Rth1+Rth2)	θ_{HS} = °C

The hot spot temperature must be in any case lower than 85°C

LIFETIME EXPECTANCY VS HOT SPOT TEMPERATURE AND VOLTAGE



Expected lifetime at hot spot calculated and V = V_W	

DISFIM Products

For Energy Storage and Discharge Applications

Based on the CONTROLLED SELF HEALING technology, AVX offers impregnated capacitors, named DISFIM, which are ideal for discharge applications.

With the controlled self-healing technology, the capacitance of the DISFIM is divided into several million elementary capacitances. The weak points in the dielectric are insulated and the capacitor continues to work without any short-circuit or risk of explosion.

DISFIM capacitors may represent more than 10,000 square meters.

Only some square millimeters of active surface are lost for every self-healing action.

Over the life of the capacitor, the capacitance gradually decreases.

The capacitor is usually designed to lose less than 5% of its initial capacitance during its whole lifetime.

Example of design with 2 epoxide flat terminals

APPLICATIONS

Power laser	Electromagnetic and ETC guns
High voltage supplies	Marx generators
Cable failure detection	Welding machine

Custom design is the rule as applications and operating conditions are various.

Feel free to send your request to your local AVX representative.

Use guide for customer's specific requirement.

CHARACTERISTICS

Voltage range from 2kV to 75kV
Maximum energy per can 150kJ
Specific energy up to 2000J/l
Lifetime up to several tens millions shots
Stray inductance from 50nH to 500nH

CONSTRUCTION

Metal case unit
Epoxide flat terminals or ceramic terminals

High Power Capacitors

Guide for Customer's Specific Requirements

This questionnaire lists the information we require to prepare an offer according to your exact requirements

Company / Name / Email	Project / Quantity

Applications	DC Filtering		Discharge*		Protection*		Tuning
Capacitance (µF)							
Tolerance (%)							
Operating Voltage		Vpeak		Vch	Vpeak	Vdc	Vrms
Ripple Voltage (peak to peak)		V					
Working Frequency (Hz)							
Operating Current		Arms		Apeak		Arms	Arms
Maximum Current/Duration	Arms	s				Apeak	
Discharge			Aperiodic	Oscillatory			
Pulse Duration (5% Ipeak)							
Time to Ipeak (µs)							
Ringing Frequency (Hz)							
Reversal Voltage (%)							
Repetition Rate				shots/min/hour/day		Hz	
Hold Time @ Full Voltage (s)							
Fault Peak Current / nb shots	Apeak	shots	Apeak	shots			
Fault Reversal Voltage (%)							
Lifetime Expectancy		hours		shots		hours	hours
Maximum Inductance (nH)							
Test Voltage between Terminals (V)							
Test Voltage between Shorted Terminals and Case (V)							
Maximum Surge Voltage (MSV)							
MSV Duration / Frequency	s	/year			s	/year	

*Due to the particularities of varying waveforms in such application, more information on the exact nature of waveform is generally required for a full analysis.

Description			
Dimensions (mm) / Shape	**Operating Position**	**Terminals**	
Section: Height: rectangular, cylindrical	vertical, horizontal inclined, upside down	type	quantity

Thermal Characteristics					
Storage Temperature (°C)		**Operating Temperature (°C)**		**Cooling Method**	
min.		min.		Natural Convection	
average		average		Forced Air (m/s)	
max.		max.		Water	

Remarks

PASSIVES

Capacitors
- Multilayer Ceramic
- Film
- Glass
- Niobium Oxide* - OxiCap®
- Pulse Supercapacitors
- Tantalum

Circuit Protection
- Thermistors
- Fuses - Thin Film
- Transient Voltage Suppressors
- Varistors - Zinc Oxide

Directional Couplers
- Thin-Film

Filters
- Ceramic
- EMI
- Noise
- SAW
- Low Pass - Thin Film

Inductors
- Thin-Film

Integrated Passive Components
- PMC - Thin-Film Networks
- Capacitor Arrays
- Feedthru Arrays
- Low Inductance Decoupling Arrays

Piezo Acoustic Generators
- Ceramic

Resistors
- Arrays
- Miniature Axials

Timing Devices
- Clock Oscillators
- MHz Quartz Crystal
- Resonators
- VCO
- TCXO

CONNECTORS

Automotive
- Standard, Custom

Board to Board
- SMD (0.4, 0.5, 1.0mm), BGA, Thru-Hole

Card Edge

DIN41612
- Standard, Inverse, High Temperature

FFC/FPC
- 0.3, 0.5, 1.0mm

Hand Held, Cellular
- Battery, I/O, SIMcard, RF shield clips

2mm Hard Metric
- Standard, Reduced Cross-Talk

IDC Wire to Board
- Headers, Plugs, Assemblies

Memory
- PCMCIA, Compact Flash, Secure Digital, MMC, Smartcard, SODIMM

Military
- H Government, DIN41612

Polytect™
- Soft Molding

Rack and Panel
- Varicon™

For more information please visit our website at http://www.avx.com

"Niobium Oxide Capacitors are manufactured and sold under patent license from Cabot Corporation, Boyertown, Pennsylvania U.S.A."

BUREAU VERITAS
Certification

C E R T I F I C A T E

awarded to

AVX TPC SA
Avenue colonel Prat
21850 Saint Apollinaire
France

BUREAU VERITAS CERTIFICATION

confirms, as an IRIS approved certification body, that the Management System of the above organization has been assessed and found to be in accordance with the

International Railway Industry Standard (IRIS) Revision 01, November 2007

for the product category

Auxiliary systems

Scope of supply

Design, development and manufacturing of power capacitors

Conception, développement et fabrication de condensateurs de puissance

Date of the audit: 17.10.2008

Date of issue of the certificate: 13.01.2009   Certificate valid until: 12.01.2012

Current date: 13.01.2009

Certificate-Register-No.: FRA-IF-000 006

AMERICAS

AVX Myrtle Beach, SC
Tel: 843-448-9411

AVX Northwest, WA
Tel: 360-699-8746

AVX Midwest, IN
Tel: 317-861-9184

AVX Mid/Pacific, CA
Tel: 408-988-4900

AVX Northeast, MA
Tel: 617-479-0345

AVX Southwest, CA
Tel: 949-859-9509

AVX Canada
Tel: 905-238-3151

AVX South America
Tel: +55-11-4688-1960

EUROPE

AVX Limited, England
Tel: +44-1252-770000

AVX S.A.S., France
Tel: +33-1-69-18-46-00

AVX GmbH, Germany
Tel: +49-8131-9004-0

AVX SRL, Italy
Tel: +39-02-614-571

AVX Czech Republic
Tel: +420-57-57-57-521

AVX/ELCO UK
Tel: +44-1638-675000

ELCO Europe GmbH
Tel: +49-2741-299-0

AVX S.A., Spain
Tel: +34-91-63-97-197

AVX Benelux
Tel: +31-187-489-337

ASIA-PACIFIC

AVX/Kyocera (S) Pte Ltd., Singapore
Tel: +65-6286-7555

AVX/Kyocera, Asia, Ltd., Hong Kong
Tel: +852-2363-3303

AVX/Kyocera Yuhan Hoesa, South Korea
Tel: +82-2785-6504

AVX/Kyocera HK Ltd., Taiwan
Tel: +886-2-2698-8778

AVX/Kyocera (M) Sdn Bhd, Malaysia
Tel: +60-4228-1190

AVX/Kyocera International Trading Co. Ltd., Shanghai
Tel: +86-21-6215-5588

AVX/Kyocera Asia Ltd., Shenzen
Tel: +86-755-3336-0615

AVX/Kyocera International Trading Co. Ltd., Beijing
Tel: +86-10-6588-3528

AVX/Kyocera India Liaison Office
Tel: +91-80-6450-0715

ASIA-KED
(KYOCERA Electronic Devices)

KED Hong Kong Ltd.
Tel: +852-2305-1080/1223

KED Hong Kong Ltd. Shenzen
Tel: +86-755-3398-9600

KED Company Ltd. Shanghai
Tel: +86-21-6217-1201

KED Hong Kong Ltd. Beijing
Tel: +86-10-5869-4655

KED Taiwan Ltd.
Tel: +886-2-2950-0268

KED Korea Yuhan Hoesa, South Korea
Tel: +82-2-783-3604/6126

KED (S) Pte Ltd. Singapore
Tel: +65-6509-0328

Kyocera Corporation Japan
Tel: +81-75-604-3449

Contact:

AVX
A KYOCERA GROUP COMPANY

http://www.avx.com

S-HPC0M509-C