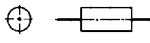
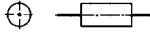
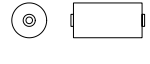
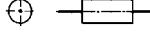
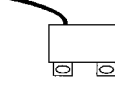
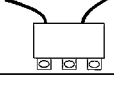


DC Film Capacitors



Film Capacitor Selector Guide

Type	Form Factor		Cap. Range (μF)	Voltage Range	Temperature Range	Applications	Highlights	Page
High Frequency, DC Filter, Polypropylene								
930	Axial Round		0.022 - 10.0	100 - 630 Vdc	−55 °C to 105 °C	DC Filtering	Small Sizes	6
935	Axial Round		1.0 - 30.0	100 - 400 Vdc	−55°C to 105 °C	DC Filtering	High Frequency Applications	11
DCF	Screw and Lug Terminals		5.0 - 100	630 Vdc	−55 °C to 105 °C	DC Filtering	High Current High Capacitance	15
Snubber, Polypropylene								
940C	Axial Round		0.1 - 4.7	600 - 3000 Vdc	−55 °C to 105 °C	Snubber	High dV/dt	18
941C	Axial Oval		0.1 - 4.7	600 - 3000 Vdc	−55 °C to 105 °C	Snubber	High dV/dt	22
942C	Axial Round		0.01 - 2.5	600 -2000 Vdc	−55 °C to 105 °C	Snubber	Very High dV/dt	26
943C	Axial Oval		0.01 - 2.5	600 - 3000 Vdc	−55 °C to 105 °C	Snubber	Very High dV/dt	30
SCD	Module		0.47 - 2.0	100 - 1200 Vdc	−40 °C to 85 °C	IGBT Snubber	Low Inductance Mount directly to the IGBT module	34
SCM	Module		0.47 - 2.0	600 - 2000 Vdc	−40 °C to 85 °C	Clamp, IGBT Snubber	Low Inductance Hyperfast Diode	37
SCC	Module		0.47 - 2.0	600 - 1200 Vdc	−40 °C to 85 °C	Dual IGBT Snubber module with diode	Low Inductance Hyperfast Diode	40
DC Link, Polypropylene								
UNL	Snap-in Cylindrical		4.7 - 35	400 -1500 Vdc	−55 °C to 85 °C	DC Link	Exceptionally low ESR High Ripple	42
944	Screw Terminal		33 - 220	800 - 1400 Vdc	−40 °C to 85 °C	DC Link	Low Inductance Low Profile	45
945	Screw Terminal		65 - 500	600 - 1000 Vdc	−55 °C to 85 °C	DC Link	Exceptionally Low ESR High Ripple Current	48
947C	Screw Terminal		110 - 1500	800 -1300 Vdc	−40 °C to 85 °C	DC Link	Non-polar Dielectric Dry, Resin Filled	51

Power Film Capacitor Application Guide

CONTENTS

DC Capacitor Overview	3
Construction	3
Metallized Capacitors	3
Film/Foil Capacitors	3
Hybrid Capacitors	3
Custom Designed Film Capacitors	4
Applications for Power Film Capacitors	4
DC Link for Inverter Applications	4
Advantages of Film vs. Aluminum Electrolytics for DC Link Apps	4
DC Output Filtering	4
IGBT Snubber	4
Definitions	4

DC FILM CAPACITORS FOR POWER ELECTRONICS AN OVERVIEW

Film capacitors are widely used in power electronics applications including but not limited to DC Link, DC output filtering, and as IGBT snubbers. The dielectric most often used is polypropylene because it has low dissipation factor (DF) that permits high AC currents with low self heating, and it performs well over the temperature range and frequencies in power electronics applications. Other materials such as polyester (PET) may be used for light duty filtering but its high dissipation factor makes it a poor selection where high AC current or high peak current at high rep rates are encountered. Materials such as polycarbonate and PPS have desirable characteristics for power electronics applications but they are in scarce supply and are therefore relatively expensive and exotic materials.

This catalog features only polypropylene types which cover the vast majority of power electronics applications.

CONSTRUCTION

The capacitor's electrode system is an important design consideration. There are three basic options for electrodes used with polypropylene capacitors. A description of each follows:

Metallized Capacitors

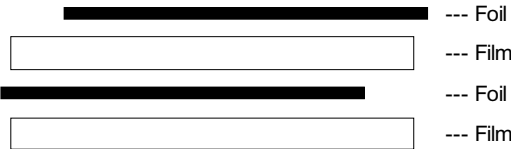


Metallized capacitors use a thin layer of vapor deposited aluminum, zinc or alloy (aluminum/zinc) blend as the electrode system. The metallized layer is only hundreds of angstroms thick, so it takes up little space in the capacitor winding relative to the dielectric thickness, measured in microns. Metallized capacitors offer the highest energy density of all of the available film constructions. Metallized capacitors also self heal. A fault in

the dielectric system vaporizes the metal deposit in the area of the fault, a process known as clearing. The result of "clearing" is a tiny amount of capacitance loss while allowing the capacitor to continue to operate without any adverse effects. If a condition arises that causes multiple clearings, such as overvoltage, or dielectric aging at end of life, the capacitor will continue to self heal and lose capacitance. The capacitor is considered to have failed when it loses 3% or more of its capacitance.

Changing the metallized electrode thickness alters the properties of the capacitor. Lighter metallization, higher ohms per square, result in higher energy density designs. While light metallization improves the voltage capabilities, it compromises the rms and peak current carrying capabilities of the capacitor. Patterned metallized layers add another dimension to the mix of options. Metallized patterns have built in fuses that further enhance the self healing capabilities and dielectric voltage withstanding properties of the system.

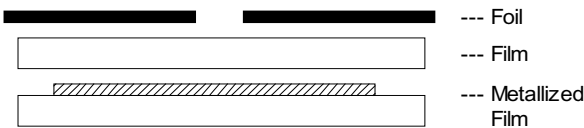
Film / Foil Capacitors



Aluminum foil electrodes are used where very high peak and rms currents are required. IGBT snubbers, for example, are designed to handle the high peak currents encountered during IGBT switching. Typical IGBT applications, such as those encountered in high power inverters, have voltage rise times exceeding 1000 V/ μ s with switching rates of 10 kHz or more. The end connections of a capacitor employing a simple metallized electrode system would deteriorate with repeated exposure to these conditions. Foil capacitors use electrodes that are about 5 microns thick to handle the high current pulses.

Foil electrodes are also used where the capacitor will see high rms current, especially where the capacitor size is small. As an example, tank circuits for induction heating devices typically require capacitors less than 100 μ F that must handle hundreds of amperes. The main benefit of the foil electrodes is to reduce the heat rise by reducing ESR. Cooler operation prevents thermal runaway and dielectric failure from self heating. The main disadvantages of foil electrode capacitors are their inability to self heal and low energy density relative to metallized types.

Hybrid Capacitors



One scheme that combines the benefits of metallized and foil electrode types, is the hybrid series capacitor. It has foil electrodes that connect to the external leads of the capacitor and a free-floating metallized electrode wound in a series configuration. The result is a self healing capacitor that handles high current pulses.

With all of these variables at play, the choice of dielectric, electrode metals, electrode thickness and metallized pattern must be considered to optimize the capacitor's performance for a specific application.

CUSTOM DESIGNED FILM CAPACITORS

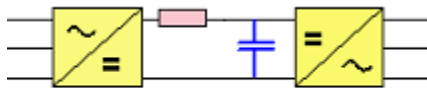
This catalog offers standard capacitor products for use in common power electronics applications. Inverter design engineers are often challenged with finding a capacitor that takes them out of the realm of standard catalog items. Packaging a capacitor to accommodate a physical bus structure is a common design challenge. Designing for a specific ripple current rating and life expectancy at a given ambient temperature is another consideration that usually requires custom solution. CDE is highly experienced in custom capacitor design and manufacturing. Where possible, we "repackage" standard materials to meet specific customer requirements.

APPLICATIONS for POWER FILM CAPACITORS

The most common applications for DC film capacitors in power electronics are DC Link, DC Filtering and snubbers for IGBT modules. A brief description of each application follows:

DC Link for Inverter Applications

Large value capacitors are used as the energy storage element or DC-Link at the DC input to the inverter. The size of the DC Link depends on the amount of AC energy it must absorb to maintain required ripple current at the DC line and the level of rms current it can handle because of ESR heating.



DC Link Capacitor

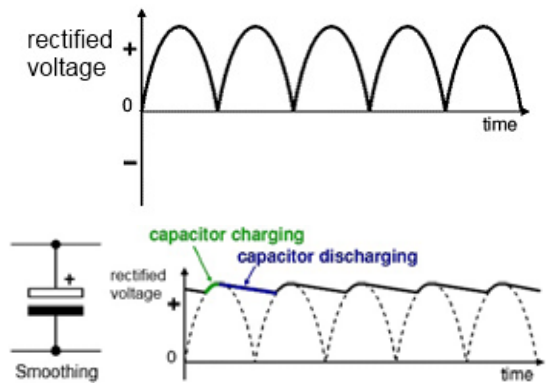
Aluminum Electrolytic capacitors offer greater capacitance per unit volume and higher energy densities compared with film. The trade-off is that the much higher ESR of aluminum electrolytic capacitors often results in capacitor banks that are oversized to handle the ripple current requirements. Polypropylene film capacitors have much lower ESR to handle the AC ripple without overheating. Film technology advantages over electrolytics are listed below.

Advantages of Film Capacitors versus Aluminum Electrolytics for DC Link Applications

- Two times the voltage capability frees you from series capacitors and voltage balancing resistors.
- Three times the ripple current capability frees you from needing excess cap to handle ripple.
- Dry construction frees you from the explosive failures with liquid electrolyte.
- Solid encapsulation delivers higher shock and vibration withstanding.
- Non-polar dielectric delivers reverse-proof mounting and AC withstanding.

DC Output Filtering

Film capacitors are widely used for DC filtering in power supplies. Their function is to smooth out the DC voltage waveform after rectification.



IGBT Snubber

As with all switching devices, IGBTs are subjected to voltage transients during turn-off operation. Voltage transients result from energy trapped in the circuit's stray inductance. The amount of voltage overshoot is dependent on the amount of stray inductance and the switching speed (dV/dt) of the IGBT. Fortunately, there are ways to protect IGBTs and other switching devices from over voltage; the most common is to use a snubber capacitor across the switch to divert the inductive current. IGBT snubbers may be terminated with lugs for direct mount across the IGBT to minimize added inductance.

DEFINITIONS

Capacitance (C)

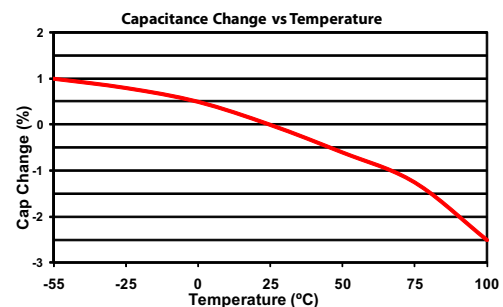
Nominal capacitance typically given at 25 °C and 1 kHz in units of microfarad (μF)

Capacitance Tolerance

Range in percent for which the capacitance may differ from rated capacitance as measured at 25 °C and 1 kHz. This range results from variances in materials and manufacturing processes rather than from temperature and or frequency characteristics. The standard manufacturing tolerance for polypropylene capacitors is ± 10% or "K" tolerance. Tighter tolerance of ± 5%, "J" tolerance, can be achieved for polypropylene, usually at a slightly higher cost.

Temperature Coefficient

The temperature coefficient is the average capacitance change per °C over a specified temperature range.



Capacitive Reactance (X_c)

The reactance is the capacitor's opposition to passing AC current. It is inversely proportional to frequency and capacitance.

$$X_c = \frac{1}{2\pi fC}$$

Equivalent Series Resistance (ESR)

The total ohmic resistance that contributes to power loss, represented by a single resistance in series with the ideal capacitor. Typically given at 25 °C at 10 kHz and 100 kHz in units of milliohms (mΩ)

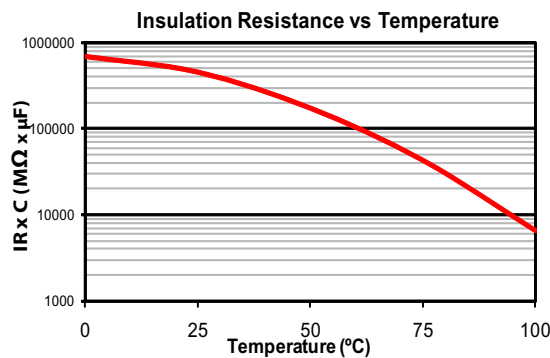
Equivalent Series Inductance (ESL)

The total series inductance of the capacitor winding including any internal connections, typically low and given at 25 °C in units of nanohenries (nH)

Insulation Resistance (IR)

The ratio of the applied voltage to leakage current (DCL), typically given in megohms (MΩ) or in the discharge time constant format MΩ x μF. The formula for insulation resistance:

$$IR = \frac{V_{dc}}{DCL}$$

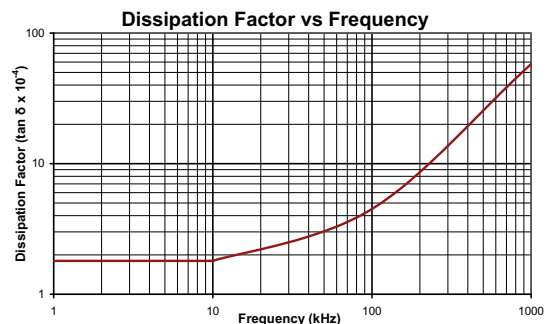
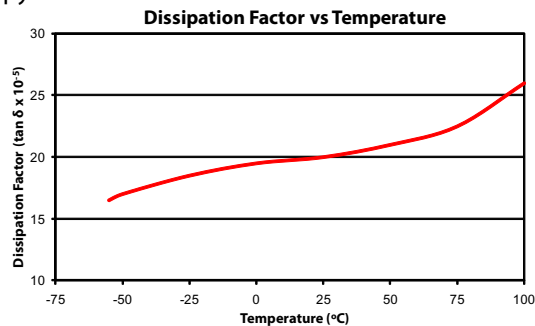


Dissipation Factor (DF, tanδ)

The ratio of the capacitor's ESR to capacitive reactance X_c , the DF of a capacitor is frequency and temperature dependent and is usually specified at 25 °C and 1 kHz.

$$DF = \frac{ESR}{X_c}$$

DF change with temperature and frequency are given for polypropylene in the curves below.



Rated DC Voltage (V_{dc})

The maximum operating peak voltage for which the capacitor has been designed for continuous operation at rated temperature.

Rated AC Voltage (V_{RMS})

The maximum operating AC rms voltage for which the capacitor has been designed for continuous operating at rated temperature, typically given at 60 Hz.

Peak Current (I_{pk})

The peak current amplitude for which the capacitor is designed, given in units of amperes (A). The Peak Current is related to dV/dt by the formula:

$$I_{pk} = C \cdot dV / dt$$

Where C is rated capacitance.

RMS Current / Ripple Current (I_{RMS})

The maximum operating rms current, typically given at a specific reference frequency and temperature in units of amperes rms (A_{RMS})

Thermal Resistance (θ_{cc}, θ_{ca})

The total thermal resistance from core to case (θ_{cc}) and case to ambient (θ_{ca}) defined as the temperature change per dissipated power (°C/W)

The formula for thermal resistance:

$$\theta_{ca} + \theta_{cc} = \frac{\Delta T}{I_{rms}^2 \cdot ESR}$$

Where ΔT is temperature rise in °C.

Life Expectancy

The life expectancy formula for the power film capacitors in this catalog* is given in terms of applied voltage and temperature.

$$Life_S = Life_R \cdot \left(\frac{V_R \cdot F}{V_A} \right)^8 \cdot 2^{\frac{T_R - T_A}{10}}$$

$Life_S$ = Service Life

$Life_R$ = Rated Life

V_R = Rated Voltage

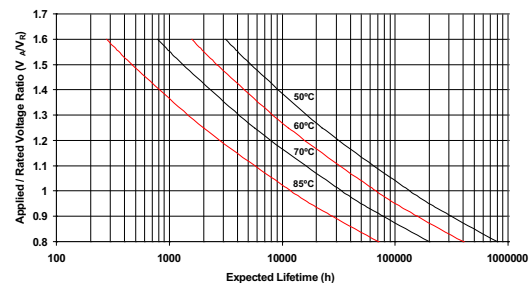
V_A = Applied Voltage

F = Voltage Acceleration Factor

T_R = Rated Temperature

T_A = Ambient Temperature

Expected Lifetime vs Core Temperature and Applied DC Voltage



* Life Expectancy curves for the DC Link types 944U and 947C are given on their datasheets.

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose



Type 930C metallized polypropylene capacitors are designed for general purpose filtering applications. Their stability and low loss characteristics make them an excellent choice for blocking, filtering, bypassing, coupling and decoupling applications. This Series is UL recognized for construction only under UL File Number E128034(N).

Highlights

- Low dissipation factor
- Self healing
- UL recognized

Specifications

Capacitance Range	0.22 to 10.0 μ F
Capacitance Tolerance	$\pm 10\%$ (K) Standard; $\pm 5\%$ (J) Optional
Rated Voltage	100 to 630 Vdc (70 to 250 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 °C to 105 °C* *Full rated voltage at 85 °C - derated linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	200,000 M Ω x μ F
Test Voltage between Terminals @ 25 °C	200% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	1,000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

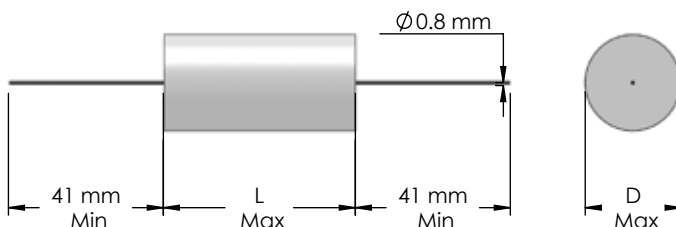
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose

Part Numbering System

930	C	1	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant Figures (μF)	Tolerance Code	RoHS Compliant Indicator
930	C = Bare Copper Wire	1 = 100 Vdc 2 = 250 Vdc 4 = 400 Vdc 6 = 630 Vdc	S = 0.0 P = 0. W = No decimal point		K = ±10% J = ±5%	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	D mm	L mm	ESR 20-100 kHz (mΩ)	dV/dt (V/μs)	Max. Ripple Current (A) 20 kHz						
						25 °C	35 °C	Case Temperature				
								45 °C	55 °C	65 °C	75 °C	85 °C
100 Vdc (70 Vac)												
.22	930C1P22K-F	7.0	19.0	---	25	2.3	2.3	2.3	2.3	2.3	1.8	1.0
.27	930C1P27K-F	7.6	19.0	---	25	2.6	2.6	2.6	2.6	2.4	1.9	1.1
.33	930C1P33K-F	8.2	19.0	---	25	2.8	2.8	2.8	2.8	2.6	2.2	1.2
.39	930C1P39K-F	8.8	19.0	---	25	3.1	3.1	3.1	3.1	2.9	2.3	1.3
.47	930C1P47K-F	9.5	19.0	37	25	3.7	3.4	3.1	2.8	2.5	2.0	1.4
.56	930C1P56K-F	8.2	25.4	35	14	3.9	3.6	3.3	2.9	2.6	2.1	1.5
.68	930C1P68K-F	8.8	25.4	33	14	4.1	3.8	3.5	3.1	2.8	2.2	1.6
.82	930C1P82K-F	9.6	25.4	31	14	4.3	4.0	3.6	3.2	2.9	2.3	1.7
1.00	930C1W1K-F	10.7	25.4	26	14	5.5	5.1	4.7	4.2	3.6	2.8	2.6
1.20	930C1W1P2K-F	11.5	25.4	24	14	5.7	5.3	4.9	4.4	3.8	3.0	2.8
1.50	930C1W1P5K-F	12.7	25.4	20	14	6.1	5.5	5.1	4.6	4.0	3.2	3.1
1.80	930C1W1P8K-F	13.7	25.4	19	14	6.3	5.7	5.3	4.8	4.1	3.4	3.0
2.00	930C1W2K-F	12.3	31.7	18	10	6.5	6.0	5.5	4.9	4.2	3.5	3.2
2.20	930C1W2P2K-F	12.9	31.7	18	10	6.8	6.3	5.7	2.1	4.4	3.6	3.3
2.70	930C1W2P7K-F	14.1	31.7	17	10	7.1	6.5	6.0	5.3	4.6	3.7	3.4
3.00	930C1W3K-F	14.8	31.7	16	10	7.3	6.7	6.2	5.5	4.8	3.9	3.5
3.30	930C1W3P3K-F	15.4	31.7	16	10	7.4	6.8	6.4	5.6	4.9	4.0	3.6
3.90	930C1W3P9K-F	16.6	31.7	15	10	7.6	6.9	6.6	5.8	5.1	4.1	3.7
4.00	930C1W4K-F	13.6	44.4	15	6	7.8	7.0	6.7	5.9	5.2	4.2	3.8
4.70	930C1W4P7K-F	14.7	44.4	15	6	8.1	7.4	6.8	6.0	5.3	4.3	3.9
5.00	930C1W5K-F	15.1	44.4	14	6	8.3	7.6	7.0	6.2	5.4	4.4	4.0
5.60	930C1W5P6K-F	15.8	44.4	14	6	8.4	7.7	7.1	6.4	5.5	4.5	4.1
6.00	930C1W6K-F	16.4	44.4	14	6	8.5	7.8	7.2	6.5	5.6	4.6	4.2
6.80	930C1W6P8K-F	17.3	44.4	13	6	8.5	8.0	7.4	6.7	5.7	4.7	4.3
8.00	930C1W8K-F	18.7	44.4	13	6	8.6	8.3	7.7	6.8	6.0	4.8	4.4
8.20	930C1W8P2K-F	18.9	44.4	13	6	8.8	8.6	8.0	7.0	6.1	4.9	4.5
10.00	930C1W10K-F	20.7	44.4	12	6	9.0	9.0	8.5	7.6	6.6	5.4	4.9
250 Vdc (175 Vac)												
.10	930C2P1K-F	8.0	19.0	---	37	1.5	1.5	1.5	1.5	1.5	1.5	.09
.12	930C2P12K-F	8.0	19.0	---	37	1.9	1.9	1.9	1.9	1.9	1.7	1.0
.15	930C2P15K-F	8.5	19.0	---	37	2.3	2.3	2.3	2.3	2.3	1.9	1.1
.18	930C2P18K-F	9.0	19.0	---	37	2.7	2.7	2.7	2.7	2.5	2.0	1.2

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose

Cap. (μF)	Catalog Part Number	D mm	L mm	ESR 20-100 kHz (mΩ)	dV/dt (V/μs)	Max. Ripple Current (A) 20 kHz						
						25 °C	35 °C	Case Temperature				
								45 °C	55 °C	65 °C	75 °C	85 °C
250 Vdc (175 Vac)												
.22	930C2P22K-F	8.5	25.4	---	21	1.9	1.9	1.9	1.9	1.9	1.9	1.3
.27	930C2P27K-F	8.5	25.4	---	21	2.4	2.4	2.4	2.4	2.4	2.2	1.4
.33	930C2P33K-F	9.2	25.4	---	21	2.9	2.9	2.9	2.9	2.9	2.3	1.5
.39	930C2P39K-F	9.9	25.4	---	21	3.4	3.4	3.4	3.2	2.9	2.3	1.6
.47	930C2P47K-F	10.7	25.4	35	21	3.8	3.7	3.6	3.4	2.9	2.4	1.7
.56	930C2P56K-F	11.8	25.4	33	21	3.9	3.8	3.7	3.5	3.1	2.5	1.8
.68	930C2P68K-F	12.0	31.7	32	15	4.0	3.9	3.8	3.7	3.2	2.6	1.9
.82	930C2P82K-F	12.0	31.7	31	15	4.2	4.1	4.0	3.9	3.4	2.8	2.0
1.00	930C2W1K-F	13.0	32.0	28	15	4.4	4.4	4.4	4.4	4.3	3.5	3.2
1.20	930C2W1P2K-F	14.1	32.0	27	15	4.7	4.6	4.5	5.0	4.5	3.7	3.3
1.50	930C2W1P5K-F	15.6	32.0	26	15	5.1	5.0	4.9	4.4	4.7	3.9	3.5
1.80	930C2W1P8K-F	16.9	31.7	25	15	5.9	5.8	5.7	5.7	5.0	4.1	3.7
2.00	930C2W2K-F	17.8	31.7	21	15	7.2	7.2	6.8	6.0	5.2	4.3	3.9
2.20	930C2W2P2K-F	16.5	44.4	20	9.0	8.4	7.5	7.0	6.3	5.4	4.5	4.1
2.70	930C2W2P7K-F	17.0	44.4	19	9.0	8.6	7.8	7.3	6.6	5.7	4.7	4.3
3.00	930C2W3K-F	17.8	44.4	18	9.0	9.0	8.3	7.6	6.8	5.9	4.8	4.4
3.30	930C2W3P3K-F	18.6	44.4	18	9.0	9.0	8.4	7.8	7.0	6.0	4.9	4.5
3.90	930C2W3P9K-F	20.2	44.4	17	9.0	9.0	8.5	8.0	7.2	6.2	5	4.6
4.00	930C2W4K-F	20.4	44.4	16	9.0	9.0	8.5	8.2	7.4	6.3	5.1	4.7
4.70	930C2W4P7K-F	22.0	44.4	16	9.0	9.0	8.8	8.5	7.7	6.6	5.3	4.9
5.00	930C2W5K-F	22.6	44.4	15	9.0	9.0	9.0	8.8	7.9	6.8	5.6	5.1
5.60	930C2W5P6K-F	23.9	44.4	15	9.0	9.0	9.0	8.9	8.0	7.0	5.8	5.3
6.00	930C2W6K-F	24.7	44.4	15	9.0	9.0	9.0	9.0	8.2	7.2	5.9	5.5
6.80	930C2W6P8K-F	22.4	57.1	15	9.0	9.0	9.0	9.0	8.4	7.4	6.0	5.6
8.00	930C2W8K-F	24.2	57.1	14	9.0	9.0	9.0	9.0	8.7	7.8	6.3	5.8
8.20	930C2W8P2K-F	24.5	57.1	14	9.0	9.0	9.0	9.0	8.8	7.9	6.4	5.9
10.00	930C2W10K-F	26.9	57.1	13	9.0	9.0	9.0	9.0	9.0	8.3	6.8	6.2
400 Vdc (250 Vac)												
.047	930C4S47K-F	8.0	19.0	---	49	1.0	1.0	1.0	1.0	1.0	1.0	0.9
.056	930C4S56K-F	8.0	19.0	---	49	1.1	1.1	1.1	1.1	1.1	1.1	0.9
.068	930C4S68K-F	8.0	19.0	---	49	1.4	1.4	1.4	1.4	1.4	1.4	1.0
.082	930C4S82K-F	8.1	19.0	---	49	1.7	1.7	1.7	1.7	1.7	1.6	1.1
.10	930C4P1K-F	8.8	19.0	---	49	2.0	2.0	2.0	2.0	2.0	1.9	1.3
.12	930C4P12K-F	7.6	25.4	---	28	1.4	1.4	1.4	1.4	1.4	1.4	1.4
.15	930C4P15K-F	8.5	25.4	---	28	1.7	1.7	1.7	1.7	1.7	1.7	1.6
.18	930C4P18K-F	9.0	25.4	---	28	2.1	2.1	2.1	2.1	2.1	2.1	1.7
.22	930C4P22K-F	9.8	25.4	---	28	2.6	2.6	2.6	2.6	2.6	2.5	1.8
.27	930C4P27K-F	10.7	25.4	---	28	3.1	3.1	3.1	3.1	3.1	2.7	1.9
.33	930C4P33K-F	11.9	25.4	---	28	3.8	3.8	3.8	3.8	3.5	2.9	2.0
.39	930C4P39K-F	12.8	25.4	---	28	4.1	4.1	4.1	4.1	3.7	3.1	2.1
.47	930C4P47K-F	13.8	25.4	32	20	5.7	5.5	5.0	4.4	3.8	3.2	2.2
.56	930C4P56K-F	12.8	32.0	31	20	5.7	5.7	5.3	4.4	4.1	3.3	2.3

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

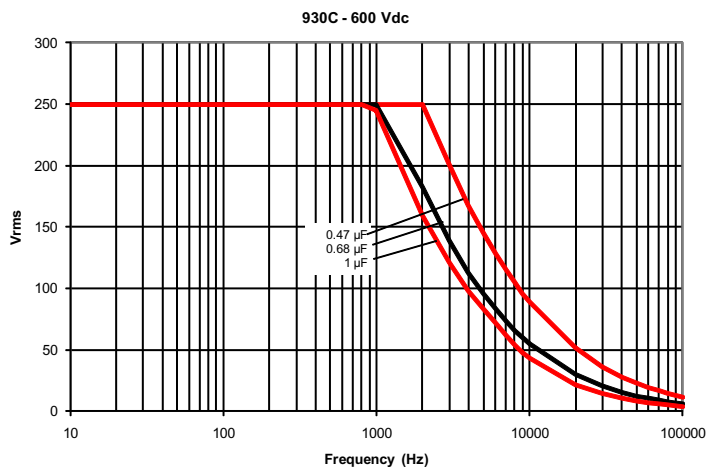
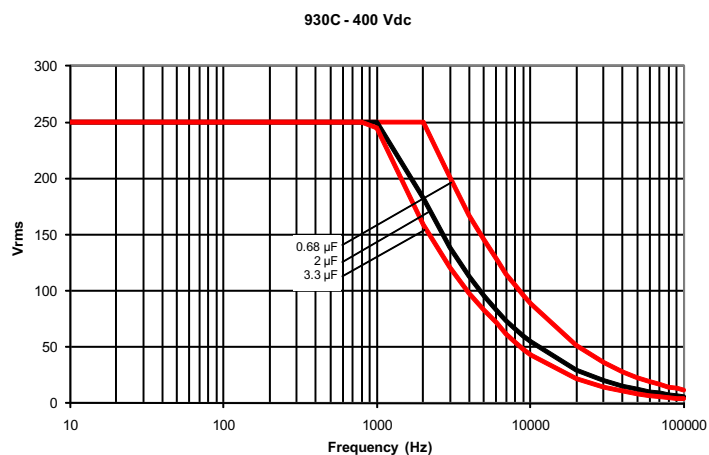
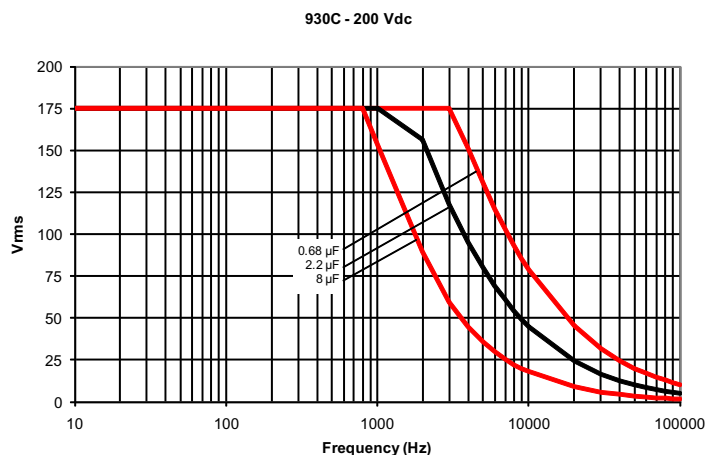
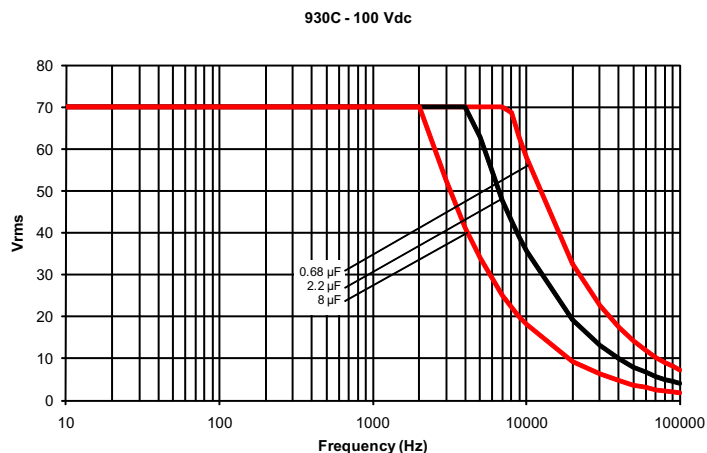
Low Dissipation, General Purpose

Cap. (μ F)	Catalog Part Number	D mm	L mm	ESR 20-100 kHz (m Ω)	dV/dt (V/ μ s)	Max. Ripple Current (A) 20 kHz						
						Case Temperature						
						25 °C	35 °C	45 °C	55 °C	65 °C	75 °C	85 °C
400 Vdc (250 Vac)												
.68	930C4P68K-F	14.0	32.0	30	20	5.7	5.7	5.5	4.8	4.3	3.5	2.4
.82	930C4P82K-F	15.2	32.0	28	20	5.7	5.7	5.6	5.3	4.5	3.7	2.6
1.00	930C4W1K-F	16.6	32.0	27	20	5.7	5.7	5.7	5.7	5.7	4.7	4.3
1.20	930C4W1P2K-F	18.1	32.0	26	20	6.3	6.2	6.0	5.9	5.8	4.9	4.5
1.50	930C4W1P5K-F	18.0	44.4	25	13	7.0	6.9	6.7	6.6	6.5	5.2	4.7
1.80	930C4W1P8K-F	18.2	44.4	23	13	8.0	7.9	7.8	7.7	6.8	5.5	5.0
2.00	930C4W2K-F	19.1	44.4	21	13	9.0	9.0	9.0	8.0	7.0	5.7	5.2
2.20	930C4W2P2K-F	21.0	44.4	20	13	9.0	9.0	9.0	8.3	7.4	5.9	5.4
2.70	930C4W2P7K-F	22.0	44.4	19	13	9.0	9.0	9.0	8.6	7.6	6.0	5.6
3.00	930C4W3K-F	23.1	44.4	17	13	9.0	9.0	9.0	9.0	7.9	6.4	5.9
3.30	930C4W3P3K-F	24.1	44.4	16	13	9.0	9.0	9.0	9.0	8.1	6.6	6.3
3.90	930C4W3P9K-F	26.2	44.4	15	13	9.0	9.0	9.0	9.0	8.3	6.8	6.5
630 Vdc (250 Vac)												
.022	930C6S22K-F	8.0	19.0	---	74	0.8	0.8	0.8	0.8	0.8	0.8	0.8
.027	930C6S27K-F	8.0	19.0	---	74	1.0	1.0	1.0	1.0	1.0	1.0	0.9
.033	930C6S33K-F	8.5	19.0	---	74	1.2	1.2	1.2	1.2	1.2	1.2	1.0
.039	930C6S39K-F	9.1	19.0	---	74	1.4	1.4	1.4	1.4	1.4	1.4	1.0
.047	930C6S47K-F	9.9	19.0	---	74	1.7	1.7	1.7	1.7	1.7	1.6	1.1
.056	930C6S56K-F	10.6	19.0	---	74	2.1	2.1	2.1	2.1	2.1	1.7	1.2
.068	930C6S68K-F	9.0	25.4	---	43	1.3	1.3	1.3	1.3	1.3	1.3	1.3
.082	930C6S82K-F	9.5	25.4	---	43	1.6	1.6	1.6	1.6	1.6	1.6	1.4
.10	930C6P1K-F	11.0	25.4	---	43	1.9	1.9	1.9	1.9	1.9	1.9	1.6
.12	930C6P12K-F	11.2	25.4	---	43	2.3	2.3	2.3	2.3	2.3	2.3	1.8
.15	930C6P15K-F	13.0	32.0	---	30	2.9	2.9	2.9	2.9	2.9	2.6	1.9
.18	930C6P18K-F	13.7	32.0	---	30	3.5	3.5	3.5	3.5	3.5	2.7	1.9
.22	930C6P22K-F	12.6	32.0	---	30	2.8	2.8	2.8	2.8	2.8	2.8	2.3
.27	930C6P27K-F	13.8	32.0	---	30	3.5	3.5	3.5	3.5	3.5	3.3	2.3
.33	930C6P33K-F	15.1	32.0	---	30	4.3	4.3	4.3	4.3	4.3	3.5	2.4
.39	930C6P39K-F	16.2	32.0	---	30	5.0	5.0	5.0	5.0	4.6	3.7	2.5
.47	930C6P47K-F	17.7	37.0	28	20	6.8	6.3	5.8	5.2	4.5	3.6	2.6
.56	930C6P56K-F	15.4	44.4	26	19	7.4	6.9	6.3	5.6	4.8	4.0	2.8
.68	930C6P68K-F	18.0	44.4	25	19	7.8	7.2	6.6	5.9	5.1	4.2	2.9
.82	930C6P82K-F	18.4	44.4	22	19	8.1	7.5	6.9	6.2	5.3	4.3	3.1
1.00	930C6W1K-F	20.2	47.0	18	19	8.6	7.9	7.3	6.5	5.6	4.6	3.6

Type 930C, Metallized Polypropylene Capacitors for DC Filtering

Low Dissipation, General Purpose

RMS Voltage vs Frequency @ 25 °C



Type 935C, Polypropylene Capacitors for High Frequency Filtering

High Current Capacitors for Switching Power Supplies



Type 935 metallized polypropylene capacitors are designed for filtering applications in switching power supplies that operate in the 20-100 kHz range. Their low ESR, high current and high capacitance gives them an advantage over general purpose types. This series is UL recognized for construction only under UL File Number E128034(N).

Highlights

- Low ESR
- High current
- High capacitance
- Self healing
- UL recognized
- Available with lugs

Specifications

Capacitance Range	1.0 to 30.0 μ F
Capacitance Tolerance	± 10 % (K) Standard; ± 5 % (J) Optional
Rated Voltage	100 to 400 Vdc (70 to 250 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 105 $^{\circ}$ C* *Full rated voltage at 85 $^{\circ}$ C - derated linearly to 50% rated at 105 $^{\circ}$ C
Maximum rms Current	Check tables for values
Insulation Resistance	200,000 M Ω x μ F
Test Voltage between Terminals @ 25 $^{\circ}$ C	200% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	3 kVac @ 50/60 Hz for 60 s
Life Test	1,000 h @ 85 $^{\circ}$ C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 $^{\circ}$ C 30,000 h @ rated Vac, 70 $^{\circ}$ C
RoHS Compliant	

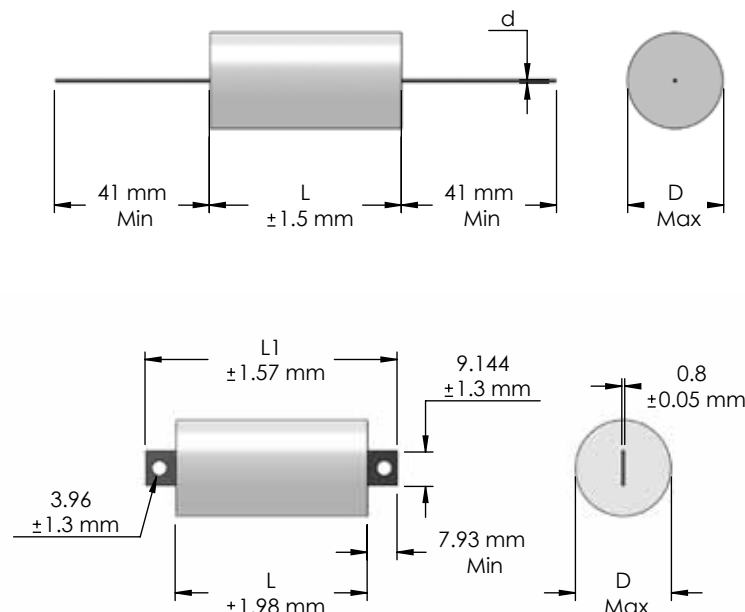
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 935C, Metallized Polypropylene Capacitors for High Frequency Filtering

High Current Capacitors for Switching Power Supplies

Part Numbering System

935	C	1	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant Figures (μF)	Tolerance Code	RoHS Compliant Indicator
935	C = Bare Copper Wire H = Copper Lugs	1 = 100 Vdc 2 = 250 Vdc 4 = 400 Vdc	W = No decimal point		K = ±10% J = ± 5%	

Ratings

Wire Leads

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	D mm	L mm	d mm	Max. ESR		Max. Ripple Current Amps RMS 20-100 kHz							
					20-100 kHz (mΩ)	dV/dt (V/μs)	Case Temperature							
							25 °C	35 °C	45 °C	55 °C	65 °C	75 °C	85 °C	
100 Vdc (70 Vac)														
1	935C1W1K-F	11.9 ± 1.6	19.0	0.8	15	25	9.2	8.5	7.8	7.0	6.0	4.9	4.5	
2	935C1W2K-F	13.6 ± 1.6	23.8	0.8	12	16	10.8	10.0	9.1	8.2	7.0	5.8	5.3	
3	935C1W3K-F	15.8 ± 2.4	23.8	1.0	11	16	12.1	11.2	10.3	9.2	8.0	6.5	5.9	
5	935C1W5K-F	16.3 ± 2.4	31.7	1.0	10	10	13.8	12.7	11.6	10.4	9.0	7.4	6.7	
10	935C1W10K-F	20.4 ± 2.4	38.1	1.0	9	8	15.0	15.0	14.2	12.7	11.0	9.0	8.2	
20	935C1W20K-F	22.2 ± 3.2	57.1	1.0	8	5	15.0	15.0	15.0	15.0	13.6	11.1	10.0	
30	935C1W30K-F	27.3 ± 3.2	57.1	1.0	6	5	15.0	15.0	15.0	15.0	15.0	12.4	11.4	
200 Vdc (140 Vac)														
1	935C2W1K-F	11.4 ± 1.6	31.7	0.8	20	15	7.3	7.3	7.3	7.3	7.2	5.9	5.4	
2	935C2W2K-F	15.4 ± 2.4	31.7	0.8	15	15	12.0	12.0	11.3	10.1	8.7	7.1	6.5	
3	935C2W3K-F	16.6 ± 2.4	38.1	1.0	13	12	15.0	13.8	12.6	11.3	9.8	8.0	7.3	
5	935C2W5K-F	19.5 ± 2.4	44.4	1.0	11	9	15.0	15.0	14.7	13.1	11.4	9.3	8.5	
10	935C2W10K-F	23.0 ± 3.2	57.1	1.0	9	7	15.0	15.0	15.0	15.0	13.8	11.3	10.3	
20	935C2W20K-F	33.4 ± 3.2	57.1	1.0	6	7	15.0	15.0	15.0	15.0	15.0	14.1	12.8	
400 Vdc (250 Vac)														
1	935C4W1K-F	15.7 ± 2.4	38.1	0.8	19	19	9.5	9.5	9.5	9.5	9.5	7.8	7.1	
2	935C4W2K-F	20.4 ± 2.4	44.4	1.0	15	16	15.0	15.0	15.0	13.4	11.6	9.5	8.7	
3	935C4W3K-F	24.4 ± 3.2	44.4	1.0	12	16	15.0	15.0	15.0	15.0	13.1	10.7	9.8	
5	935C4W5K-F	27.1 ± 3.2	57.1	1.0	10	11	15.0	15.0	15.0	15.0	15.0	12.5	11.4	
10	935C4W10K-F	39.2 ± 3.2	57.1	1.0	6	11	15.0	15.0	15.0	15.0	15.0	15.0	14.1	

Type 935C, Metallized Polypropylene Capacitors for High Frequency Filtering

High Current Capacitors for Switching Power Supplies

Lug Leads

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

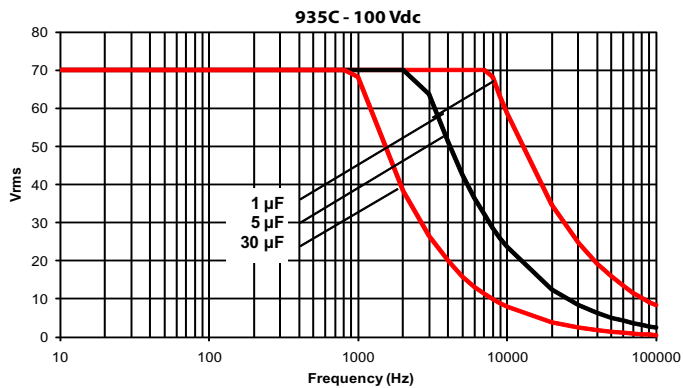
Cap. (μ F)	Catalog Part Number	D mm	L mm	L1 mm	Max. ESR		Max. Ripple Current Amps RMS 20-100 kHz							
					20-100 kHz	dV/dt	Case Temperature							
					(m Ω)	(V/ μ s)	25 °C	35 °C	45 °C	55 °C	65 °C	75 °C	85 °C	
100 Vdc (70 Vac)														
1	935H1W1K-F	11.9 $\pm$ 1.6	19.0	41.6	15	25	10.3	9.5	8.7	7.8	6.7	5.5	5.0	
2	935H1W2K-F	13.6 $\pm$ 1.6	23.8	46.4	12	16	12.0	11.0	10.0	8.9	7.8	6.3	5.8	
3	935H1W3K-F	15.8 $\pm$ 2.4	23.8	46.4	11	16	13.3	12.3	11.2	10.0	8.7	7.1	6.5	
5	935H1W5K-F	16.3 $\pm$ 2.4	31.7	53.3	10	10	14.8	13.7	12.5	11.2	9.7	7.9	7.2	
10	935H1W10K-F	20.4 $\pm$ 2.4	38.1	57.2	9	8	17.8	16.5	15.0	13.5	11.7	9.5	8.7	
20	935H1W20K-F	22.2 $\pm$ 3.2	57.1	77.6	8	5	21.6	20.0	18.3	16.4	14.2	11.6	10.6	
30	935H1W30K-F	27.3 $\pm$ 3.2	57.1	77.6	6	5	24.3	22.5	20.5	18.4	15.9	13.0	11.9	
200 Vdc (140 Vac)														
1	935H2W1K-F	11.4 $\pm$ 1.6	31.7	53.3	20	15	7.3	7.3	7.3	7.3	7.3	6.4	5.8	
2	935H2W2K-F	15.4 $\pm$ 2.4	31.7	53.3	15	15	14.3	13.3	12.1	10.8	9.4	7.7	7.0	
3	935H2W3K-F	16.6 $\pm$ 2.4	38.1	57.2	13	12	15.9	14.7	13.5	12.0	10.4	8.5	7.8	
5	935H2W5K-F	19.5 $\pm$ 2.4	44.4	65.3	11	9	18.3	17.0	15.5	13.9	12.0	9.8	8.9	
10	935H2W10K-F	23.0 $\pm$ 3.2	57.1	77.6	9	7	22.4	20.7	18.9	16.9	14.6	12.0	10.9	
20	935H2W20K-F	33.4 $\pm$ 3.2	57.1	77.6	6	7	27.4	25.4	23.2	20.7	17.9	14.7	13.4	
400 Vdc (250 Vac)														
1	935H4W1K-F	15.7 $\pm$ 2.4	38.1	57.2	19	19	9.5	9.5	9.5	9.5	9.5	8.3	7.5	
2	935H4W2K-F	20.4 $\pm$ 2.4	44.4	65.3	15	16	15.0	15.0	15.0	14.2	12.3	10.0	9.1	
3	935H4W3K-F	24.4 $\pm$ 3.2	44.4	65.3	12	16	21.1	19.5	17.8	15.9	13.8	11.3	10.3	
5	935H4W5K-F	27.1 $\pm$ 3.2	57.1	77.6	10	11	24.4	22.6	20.6	18.5	16.0	13.1	11.9	
10	935H4W10K-F	39.2 $\pm$ 3.2	57.1	77.6	6	11	30.0	27.8	25.4	22.7	19.7	16.1	14.7	

Type 935C, Metallized Polypropylene Capacitors for High Frequency Filtering

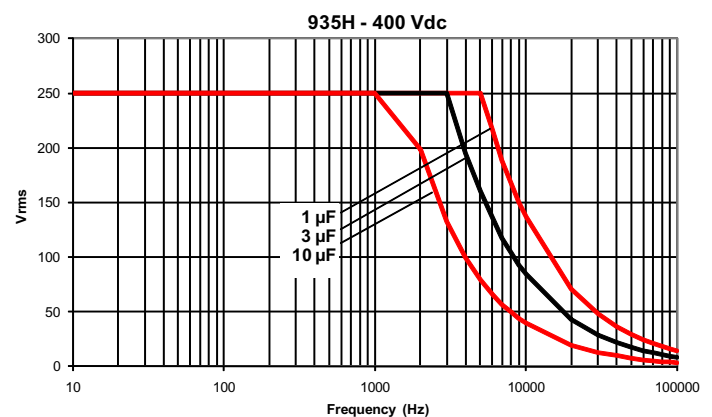
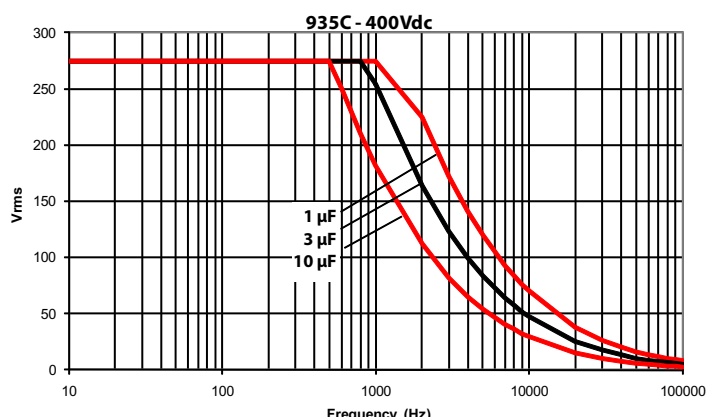
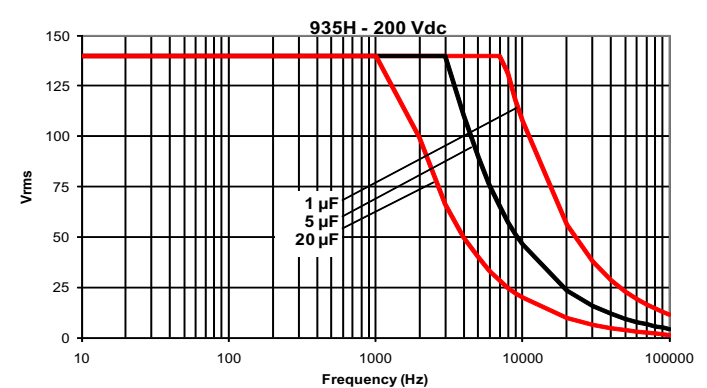
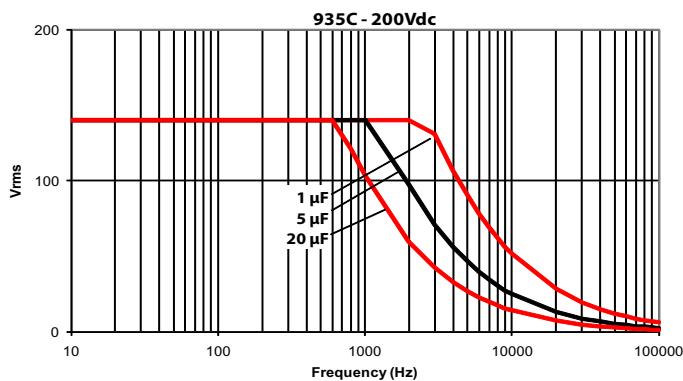
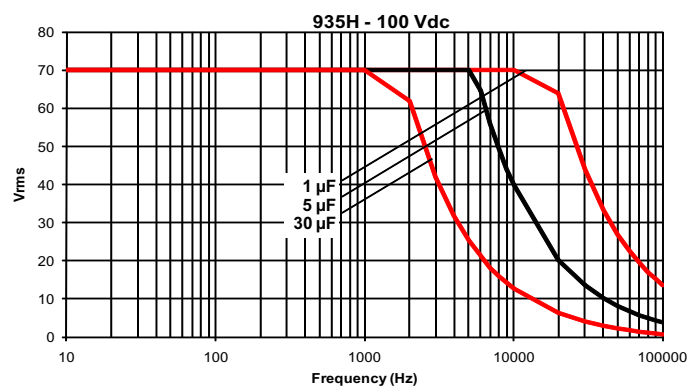
High Current Capacitors for Switching Power Supplies

RMS Voltage vs Frequency @ 25 °C

Wire Leads



Lug Leads



Type DCF, Polypropylene Capacitors for High Current Filtering

Large Capacitance Values, High Current Ratings for DC Filtering



Type DCF metallized polypropylene capacitors are designed for high current DC filtering and DC link applications. Low ESR and high capacitance, combined with a wide selection of robust terminals, allow this series to handle high ripple current.

Highlights

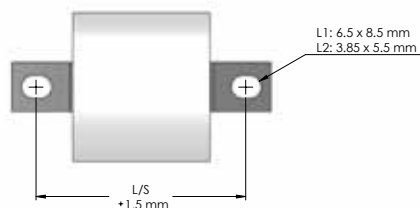
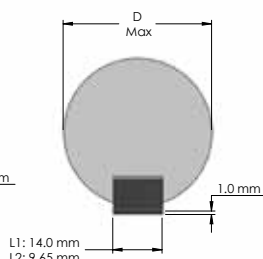
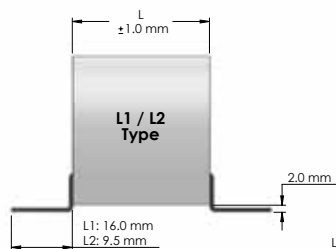
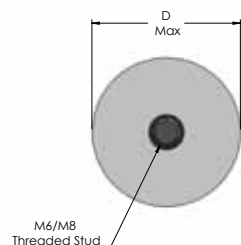
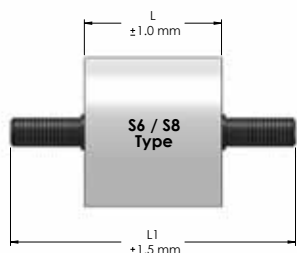
- High capacitance
- Low ESR
- Robust terminal/mounting options
- High current
- Self healing

Specifications

Capacitance Range	5.0 to 100 μ F
Capacitance Tolerance	$\pm 10\%$ (K) standard, $\pm 5\%$ (J) optional
Rated Voltage	630 Vdc (250 Vac, 50/60 Hz)
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 105 $^{\circ}$ C Full rated voltage @ 85 $^{\circ}$ C, derate linearly to 50% rated voltage at 105 $^{\circ}$ C
Maximum rms Current	Check tables for values
Insulation Resistance	30,000 $\mu\Omega \times \mu$ F after 120 s and 500 V charge
Test Voltage between Terminals @ 25 $^{\circ}$ C	800 Vdc for 60 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	3 kVac @ 50/60 Hz for 60 s
Life Test	2000 h @ 85 $^{\circ}$ C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 $^{\circ}$ C 30,000 h @ rated Vac, 70 $^{\circ}$ C
RoHS Compliant	

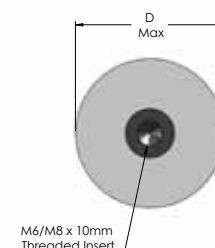
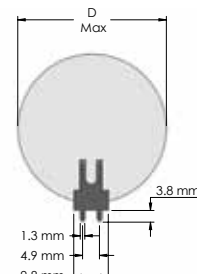
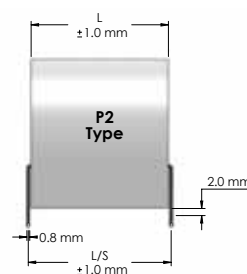
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper or Brass



Type DCF, Polypropylene Capacitors for High Current Filtering

Large Capacitance Values, High Current Ratings for DC Filtering

Part Numbering System

DCF	6	W	22	K	B/S/P/L	-F
Type	Voltage	Capacitance	Capacitance	Tolerance	Terminal	RoHS
	Code	Decimal Point	Significant figures in μF	Code	Style	Compliance Indicator
	6 = 630 Vdc	W = No decimal point		K = $\pm 10\%$ J = $\pm 5\%$	B6 = M6 Insert B8 = M8 Insert S6 = M6 studs S8 = M8 studs P2 = 2 pins Lug L1 = type 1 Lug L2 = type 2 Lug	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap (μ F)	Catalog Part Number	D Max. mm	L $\pm$ 1.0 mm	L1/LS	Ripple Current					Reson. Freq. (kHz)	Peak Current (Ipeak)	dv/dt (V/ μ s)
				$\pm$ 1.5 mm	ESR Typical (m Ω)	@ 25 kHz						
				Or As Specified		25°C	55°C	85°C				
				mm		(Amps rms)						
630 Vdc (250 Vac, 50/60 Hz)												
5.0	DCF6W5KP2-F	33.4	29.0	29.8 $\pm$ 1.0	3.42	25.0	18.7	7.0	410.0	660	132	
5.0	DCF6W5KL2-F	33.4	30.0	40.0	3.42	25.0	18.7	7.0	410.0	660	132	
10.0	DCF6W10KP2-F	34.8	39.0	38.8 $\pm$ 1.0	3.00	25.0	23.0	8.5	248.0	760	76	
10.0	DCF6W10KL2-F	34.8	41.0	49.0	3.00	31.0	23.0	8.7	248.0	760	76	
15.0	DCF6W15KB*-F	42.2	49.0	57.0	2.40	38.7	28.7	10.8	203.0	1140	76	
15.0	DCF6W15KS*-F	42.2	39.0	81.0	2.40	38.7	28.7	10.8	203.0	1140	76	
15.0	DCF6W15KL1-F	42.2	41.0	58.0	2.40	38.7	28.7	10.8	203.0	1140	76	
20.0	DCF6W20KB*-F	41.3	57.5	66.5	2.23	42.3	31.4	11.8	152.0	1040	52	
20.0	DCF6W20KS*-F	41.3	47.5	90.5	2.23	42.3	31.4	11.8	152.0	1040	52	
20.0	DCF6W20KL1-F	41.3	49.5	67.5	2.23	42.3	31.4	11.8	152.0	1040	52	
25.0	DCF6W25KB*-F	46.0	57.5	66.5	2.30	44.7	33.0	12.6	136.0	1300	52	
25.0	DCF6W25KS*-F	46.0	47.5	90.5	2.30	44.7	33.0	12.6	136.0	1300	52	
25.0	DCF6W25KL1-F	46.0	49.5	67.5	2.30	44.7	33.0	12.6	136.0	1300	52	
30.0	DCF6W30KB*-F	50.3	57.5	66.5	2.63	44.4	33.0	12.5	124.0	1560	52	
30.0	DCF6W30KS*-F	50.3	47.5	90.5	2.63	44.4	33.0	12.5	124.0	1560	52	
30.0	DCF6W30KL1-F	50.3	49.5	67.5	2.63	44.4	33.0	12.5	124.0	1560	52	
35.0	DCF6W35KB*-F	54.2	57.5	66.5	2.43	48.5	36.0	13.6	115.0	1820	52	
35.0	DCF6W35KS*-F	54.2	47.5	90.5	2.43	48.5	36.0	13.6	115.0	1820	52	
35.0	DCF6W35KL1-F	54.2	49.5	67.5	2.43	48.5	36.0	13.6	115.0	1820	52	
40.0	DCF6W40KB*-F	57.7	57.5	66.5	2.30	52.1	38.7	14.6	108.0	2080	52	
40.0	DCF6W40KS*-F	57.7	47.5	90.5	2.30	52.1	38.7	14.6	108.0	2080	52	
40.0	DCF6W40KL1-F	57.7	49.5	67.5	2.30	52.1	38.7	14.6	108.0	2080	52	
45.0	DCF6W45KB*-F	53.3	68.0	77.0	2.20	53.9	40.9	15.6	90.0	1710	38	

* Replace with 6 for M6 inserts or studs

* Replace with 8 for M8 inserts or studs

ESR measured at Resonant Frequency for capacitance values above 15 μF or 6 m Ω Max. at 20 kHz

Type DCF, Polypropylene Capacitors for High Current Filtering

Large Capacitance Values, High Current Ratings for DC Filtering

Cap (μF)	Catalog Part Number	D Max. mm	L ± 1.0 mm	L1/LS	Ripple Current					Reson. Freq. (kHz)	Peak Current (Ipeak)	dv/dt (V/μs)
				±1.5 mm	@ 25 kHz							
				Or As Specified	ESR Typical	25°C	55°C	85°C				
				mm	(mΩ)	(Amps rms)						
630 Vdc (250 Vac, 50/60 Hz)												
45.0	DCF6W45KS*-F	53.3	58.0	101.0	2.20	53.9	40.9	15.6	90.0	1710	38	
45.0	DCF6W45KL1-F	53.3	60.0	78.0	2.20	53.9	40.9	15.6	90.0	1710	38	
50.0	DCF6W50KB*-F	56.1	68.0	77.0	2.60	51.3	38.1	14.4	85.0	1900	38	
50.0	DCF6W50KS*-F	56.1	58.0	101.0	2.60	51.3	38.1	14.4	85.0	1900	38	
50.0	DCF6W50KL1-F	56.1	60.0	78.0	2.60	51.3	38.1	14.4	85.0	1900	38	
55.0	DCF6W55KB*-F	58.6	68.0	77.0	2.50	53.9	40.0	15.1	80.0	2090	38	
55.0	DCF6W55KS*-F	58.6	58.0	101.0	2.50	53.9	40.0	15.1	80.0	2090	38	
55.0	DCF6W55KL1-F	58.6	60.0	78.0	2.50	53.9	40.0	15.1	80.0	2090	38	
60.0	DCF6W60KB*-F	61.2	68.0	77.0	2.30	55.5	41.2	15.6	77.0	2280	38	
60.0	DCF6W60KS*-F	61.2	58.0	101.0	2.30	55.5	41.2	15.6	77.0	2280	38	
60.0	DCF6W60KL1-F	61.2	60.0	78.0	2.30	55.5	41.2	15.6	77.0	2280	38	
70.0	DCF6W70KB*-F	57.4	83.0	92.0	2.85	53.9	40.0	15.1	63.0	1960	28	
70.0	DCF6W70KS*-F	57.4	73.0	116.0	2.85	53.9	40.0	15.1	63.0	1960	28	
70.0	DCF6W70KL1-F	57.4	75.0	93.0	2.85	53.9	40.0	15.1	63.0	1960	28	
80.0	DCF6W80KB*-F	60.3	83.0	92.0	2.67	57.5	42.7	16.1	59.0	2240	28	
80.0	DCF6W80KS*-F	60.3	73.0	116.0	2.67	57.5	42.7	16.1	59.0	2240	28	
80.0	DCF6W80KL1-F	60.3	75.0	93.0	2.67	57.5	42.7	16.1	59.0	2240	28	
90.0	DCF6W90KB*-F	57.5	96.0	105.0	3.07	55.2	41.0	15.5	51.0	2520	28	
90.0	DCF6W90KS*-F	57.5	86.0	129.0	3.07	55.2	41.0	15.5	51.0	2520	28	
90.0	DCF6W90KL1-F	57.5	88.0	106.0	3.07	55.2	41.0	15.5	51.0	2520	28	
100.0	DCF6W100KB*-F	60.7	96.0	105.0	2.90	60.0	43.6	16.5	48.0	2300	23	
100.0	DCF6W100KS*-F	60.7	86.0	129.0	2.90	60.0	43.6	16.5	48.0	2300	23	
100.0	DCF6W100KL1-F	60.7	88.0	106.0	2.90	60.0	43.6	16.5	48.0	2300	23	

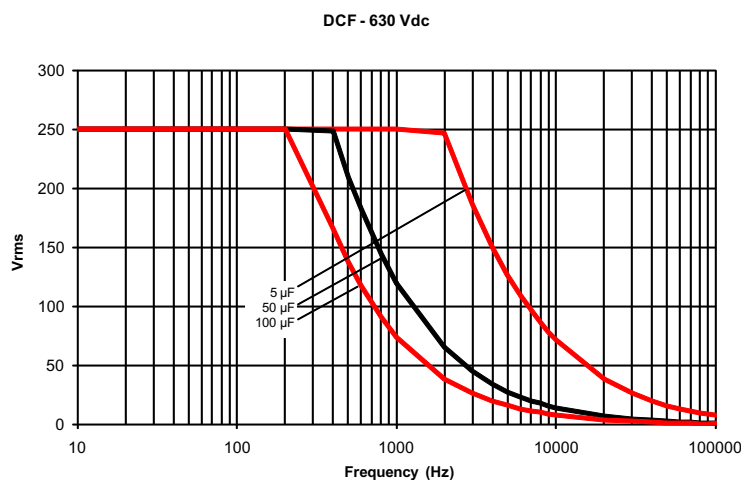
* Replace with 6 for M6 inserts or studs

* Replace with 8 for M8 inserts or studs

ESR measured at Resonant Frequency for capacitance values above 15 μ F or 6 m Ω Max. at 20 kHz

Note: Additional voltage and capacitance values are available upon request.

RMS Voltage vs Frequency @ 25 °C



Type 940C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications



Type 940 round, axial leaded film capacitors have polypropylene film and dual metallized electrodes for both self healing properties and high peak current carrying capability (dV/dt). This series features low ESR characteristics, excellent high frequency and high voltage capabilities.

Highlights

- High dV/dt
- High pulse current
- Low inductance
- Self healing

Specifications

Capacitance Range	0.01 to 4.7 μ F
Capacitance Tolerance	$\pm$ 10% Standard Tolerance
Rated Voltage	600 to 3000 Vdc (275 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 °C to 105 °C* *Full rated voltage at 85 °C - derated linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25 °C	160% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

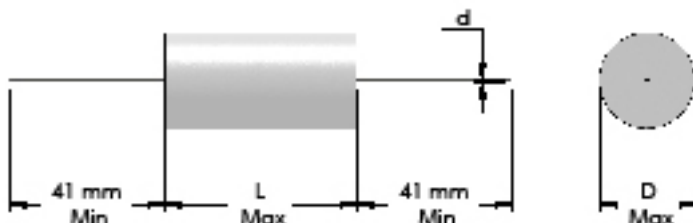
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 940C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

Part Numbering System

940	C	6	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant figures in μF	Tolerance Code	RoHS Compliant Indicator
940	C = Bare Copper Wire F = Insulated Stranded Wire H = Tinned Lugs	6 = 600 Vdc 8 = 800 Vdc 10 = 1000 Vdc 12 = 1200 Vdc	16 = 1600 Vdc 20 = 2000 Vdc 30 = 3000 Vdc S = 0.0 P = 0. W = No decimal point		K = $\pm 10\%$	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap.	Catalog Part Number	D	L	d	Typical ESR	Typical ESL	dV/dt	I peak	I _{RMS} 70 °C
(μF)		mm	mm	mm	(m Ω)	(nH)	V/ μs	(A)	100 kHz (A)
600 Vdc (275 Vac)									
.10	940C6P1K-F	9.0	34.0	0.8	28	19	196	20	2.5
.15	940C6P15K-F	10.5	34.0	0.8	13	20	196	29	4.0
.22	940C6P22K-F	11.5	34.0	0.8	12	20	196	43	4.4
.33	940C6P33K-F	13.5	34.0	0.8	9	21	196	65	5.6
.47	940C6P47K-F	15.5	34.0	1.0	7	22	196	92	6.9
.68	940C6P68K-F	18.0	34.0	1.0	6	23	196	134	8.1
1.00	940C6W1K-F	21.0	34.0	1.0	6	24	196	196	8.9
1.50	940C6W1P5K-F	25.0	34.0	1.2	5	26	196	295	10.9
2.00	940C6W2K-F	23.5	46.0	1.2	5	31	128	255	11.8
3.30	940C6W3P3K-F	27.0	54.0	1.2	4	36	105	346	15.3
4.70	940C6W4P7K-F	31.5	54.0	1.2	4	38	105	492	16.8
850 Vdc (450 Vac)									
.15	940C8P15K-F	13.0	34.0	0.8	8	21	713	107	5.8
.22	940C8P22K-F	15.5	34.0	1.0	8	22	713	157	6.4
.33	940C8P33K-F	18.0	34.0	1.0	7	23	713	235	7.5
.47	940C8P47K-F	21.0	34.0	1.0	5	24	713	335	9.8
.68	940C8P68K-F	24.5	34.0	1.2	4	26	713	485	12.0
1.00	940C8W1K-F	22.5	46.0	1.2	5	30	400	400	11.5
1.50	940C8W1P5K-F	27.0	46.0	1.2	4	32	400	600	14.3
2.00	940C8W2K-F	30.5	46.0	1.2	3	34	400	800	17.9
2.20	940C8W2P2K-F	32.0	46.0	1.2	3	34	400	880	18.4
2.50	940C8W2P5K-F	34.0	46.0	1.2	3	35	400	1000	19.1
1000 Vdc (500 Vac)									
.15	940C10P15K-F	15.0	34.0	1.0	7	22	856	128	6.7
.22	940C10P22K-F	17.5	34.0	1.0	7	23	856	188	7.4
.33	940C10P33K-F	20.5	34.0	1.0	6	24	856	283	8.8
.47	940C10P47K-F	24.0	34.0	1.2	5	26	856	402	10.6
.68	940C10P68K-F	28.0	34.0	1.2	5	27	856	582	11.7
1.00	940C10W1K-F	26.0	46.0	1.2	5	32	480	480	12.5
1.50	940C10W1P5K-F	31.0	46.0	1.2	4	34	480	720	15.6
2.00	940C10W2K-F	35.5	46.0	1.2	3	36	480	960	19.6

Type 940C, Polypropylene Capacitors, for Pulse, Snubber

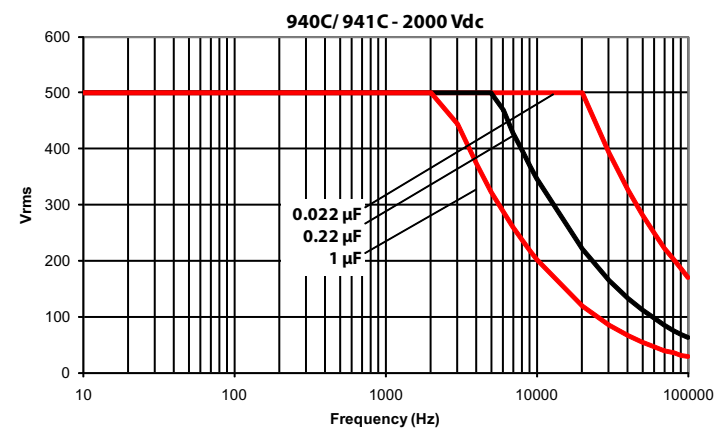
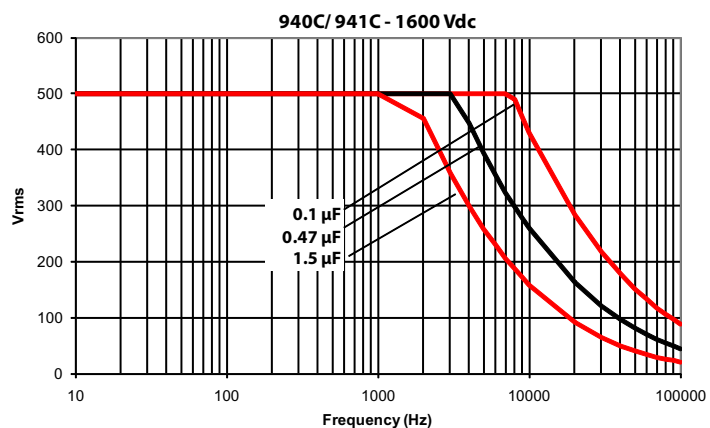
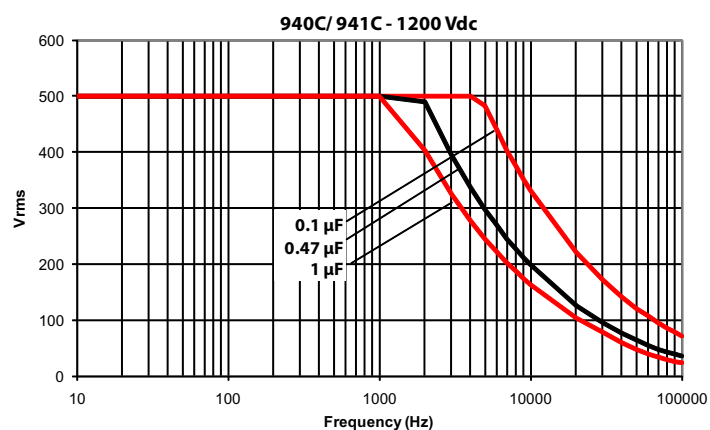
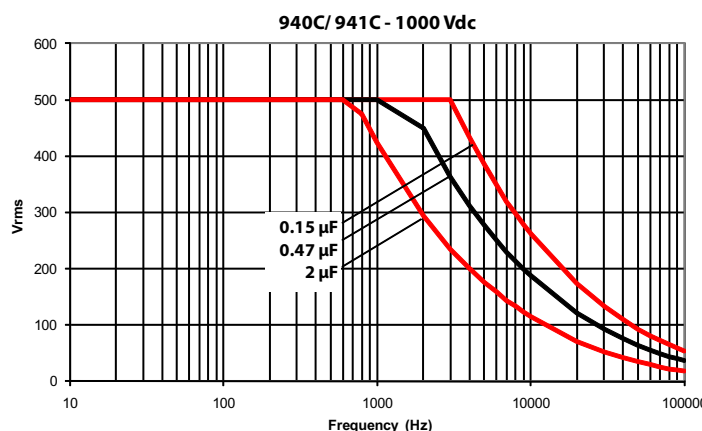
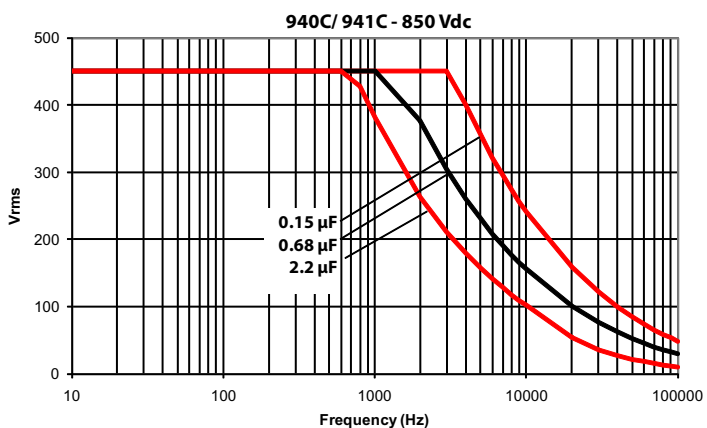
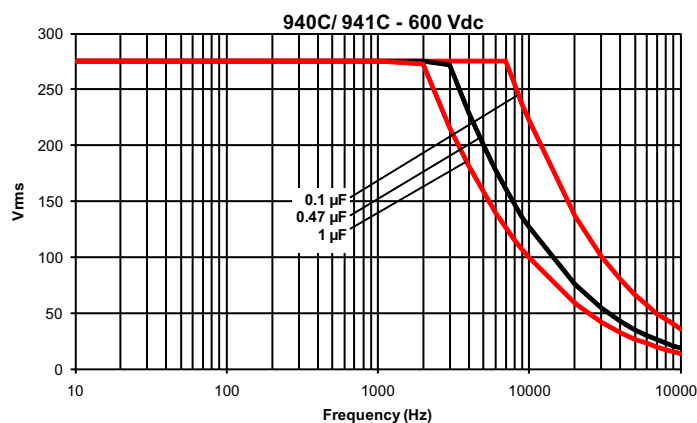
High dV/dt for Snubber Applications

Cap. (μ F)	Catalog Part Number	D mm	L mm	d mm	Typical ESR (m Ω)	Typical ESL (nH)	dV/dt V/ μ s	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
1200 Vdc (500 Vac)									
.10	940C12P1K-F	15.5	34.0	1.0	9	22	1142	114	6.1
.15	940C12P15K-F	18.5	34.0	1.0	7	23	1142	171	7.6
.22	940C12P22K-F	21.5	34.0	1.0	7	24	1142	251	8.4
.33	940C12P33K-F	20.0	46.0	1.0	7	29	640	211	9.0
.47	940C12P47K-F	23.0	46.0	1.2	7	30	640	301	9.8
.68	940C12P68K-F	27.0	46.0	1.2	6	32	640	435	11.7
1.00	940C12W1K-F	33.0	46.0	1.2	5	35	640	640	14.5
1.50	940C12W1P5K-F	35.0	54.0	1.2	4	39	502	754	17.9
1600 Vdc (500 Vac)									
.10	940C16P1K-F	18.0	34.0	1.0	7	23	1427	143	7.5
.15	940C16P15K-F	21.5	34.0	1.0	5	24	1427	214	9.9
.22	940C16P22K-F	25.5	34.0	1.2	7	26	1427	314	9.3
.33	940C16P33K-F	23.5	46.0	1.2	7	31	800	264	10.0
.47	940C16P47K-F	27.5	46.0	1.2	6	32	800	376	11.8
.68	940C16P68K-F	32.5	46.0	1.2	6	35	800	544	13.1
1.00	940C16W1K-F	39.0	46.0	1.2	5	37	800	800	16.2
1.50	940C16W1P5K-F	42.0	54.0	1.2	4	42	628	942	20.1
2000 Vdc (500 Vac)									
.022	940C20S22K-F	11.5	34.0	0.8	35	6	1712	38	2.6
.033	940C20S33K-F	13.5	34.0	0.8	20	21	1712	57	3.8
.047	940C20S47K-F	15.0	34.0	1.0	12	22	1712	80	5.2
.068	940C20S68K-F	17.5	34.0	1.0	8	23	1712	116	6.9
.100	940C20P1K-F	21.0	34.0	1.0	7	24	1712	171	8.3
.150	940C20P15K-F	19.5	46.0	1.0	7	29	960	144	8.9
.220	940C20P22K-F	22.0	46.0	1.0	8	30	960	211	9.0
.330	940C20P33K-F	27.0	46.0	1.2	8	32	960	317	10.1
.470	940C20P47K-F	32.0	46.0	1.2	6	34	960	451	13.0
.560	940C20P56K-F	31.0	54.0	1.2	7	37	754	422	12.6
.680	940C20P68K-F	34.0	54.0	1.2	6	39	754	513	14.3
1.00	940C20W1K-F	41.0	54.0	1.2	5	42	754	754	17.7
3000 Vdc (500 Vac)									
.010	940C30S1K-F	11.5	34.0	0.8	60	20	2568	26	2.0
.015	940C30S15K-F	13.5	34.0	0.8	40	21	2568	39	2.7
.022	940C30S22K-F	15.5	34.0	1.0	25	22	2568	57	3.6
.033	940C30S33K-F	18.0	34.0	1.0	14	23	2568	85	5.3
.047	940C30S47K-F	16.5	46.0	1.0	14	28	1440	68	5.7
.068	940C30S68K-F	19.0	46.0	1.0	12	29	1440	98	6.7
.100	940C30P1K-F	22.5	46.0	1.2	10	30	1440	144	8.1
.150	940C30P15K-F	27.0	46.0	1.2	8	32	1440	216	10.1

Type 940C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type 941C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications



Type 941C flat, oval film capacitors are constructed with polypropylene film and dual metallized electrodes for both self healing properties and high peak current carrying capability (dV/dt). This series features low ESR characteristics, excellent high frequency and high voltage capabilities.

Highlights

- High dV/dt
- High ripple current
- Low inductance
- Self healing

Specifications

Capacitance Range	0.01 to 4.7 μ F
Capacitance Tolerance	$\pm 10\%$ Standard Tolerance
Rated Voltage	600 to 3000 Vdc (275 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 105 $^{\circ}$ C* *Full rated voltage at 85 $^{\circ}$ C - derated linearly to 50% rated at 105 $^{\circ}$ C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25 $^{\circ}$ C	160% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 $^{\circ}$ C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 $^{\circ}$ C 30,000 h @ rated Vac, 70 $^{\circ}$ C
RoHS Compliant	

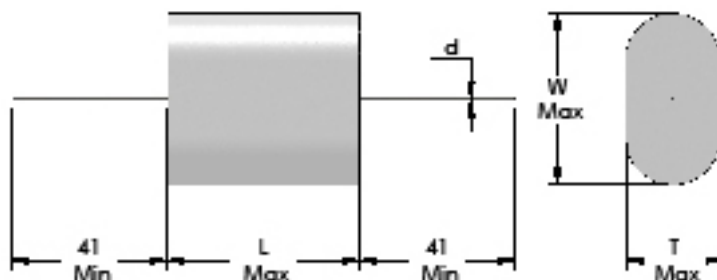
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 941C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

Part Numbering System

941	C	6	P	22	K	-F
Series	Termination Code	Voltage Code	Capacitance Decimal Point	Capacitance Significant Figures (μF)	Tolerance Code	RoHS Compliant Indicator
941	C = Bare Copper Wire F = Insulated Stranded Wire H = Tinned Lugs	6 = 600 Vdc 8 = 850 Vdc 10 = 1000 Vdc 12 = 1200 Vdc	16 = 1600 Vdc 20 = 2000 Vdc 30 = 3000 Vdc	S = 0.0 P = 0. W = No decimal point	K = ±10%	

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (mΩ)	Typical ESL (nH)	dV/dt (V/μs)	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
600 Vdc (275 Vac)										
.10	941C6P1K-F	5.7	11.9	34.0	0.8	28	17	196	20	2.8
.15	941C6P15K-F	6.8	13.0	34.0	0.8	13	18	196	29	4.4
.22	941C6P22K-F	8.1	14.3	34.0	0.8	12	19	196	43	4.9
.33	941C6P33K-F	9.8	16.1	34.0	0.8	9	19	196	65	6.1
.47	941C6P47K-F	11.7	18.0	34.0	0.8	7	20	196	92	7.6
.68	941C6P68K-F	14.2	20.4	34.0	1.0	6	21	196	134	8.9
1.0	941C6W1K-F	17.3	23.5	34.0	1.0	6	23	196	196	9.9
1.5	941C6W1P5K-F	21.3	27.5	34.0	1.2	5	24	196	295	12.1
2.0	941C6W2K-F	18.2	27.6	46.0	1.2	5	28	128	255	13.1
3.3	941C6W3P3K-F	22.5	31.8	54.0	1.2	4	34	105	346	17.3
4.7	941C6W4P7K-F	28.6	33.3	54.0	1.2	4	36	105	492	18.7
850 Vdc (450 Vac)										
.15	941C8P15K-F	9.6	15.9	34.0	0.8	8	19	713	107	6.4
.22	941C8P22K-F	11.6	17.9	34.0	0.8	8	20	713	157	7.0
.33	941C8P33K-F	14.3	20.6	34.0	1.0	7	21	713	235	8.3
.47	941C8P47K-F	17.1	23.4	34.0	1.0	5	22	713	335	10.8
.68	941C8P68K-F	20.7	27.0	34.0	1.2	4	24	713	485	13.3
1.0	941C8W1K-F	17.2	26.7	46.0	1.2	5	28	400	400	12.7
1.5	941C8W1P5K-F	21.5	30.9	46.0	1.2	4	30	400	600	15.8
2.0	941C8W2K-F	25.1	34.6	46.0	1.2	3	31	400	800	19.8
2.2	941C8W2P2K-F	26.5	35.9	46.0	1.2	3	32	400	880	20.4
2.5	941C8W2P5K-F	28.4	37.8	46.0	1.2	3	33	400	1000	21.2
1000 Vdc (500 Vac)										
.15	941C10P15K-F	11.2	17.5	34.0	0.8	7	20	856	128	7.4
.22	941C10P22K-F	13.6	19.9	34.0	1.0	7	21	856	188	8.1
.33	941C10P33K-F	16.7	23.0	34.0	1.0	6	22	856	283	9.7
.47	941C10P47K-F	20.1	26.3	34.0	1.2	5	24	856	402	11.7
.68	941C10P68K-F	24.2	30.5	34.0	1.2	5	26	856	582	13.0
1.0	941C10W1K-F	20.4	29.8	46.0	1.2	5	24	480	480	13.8
1.5	941C10W1P5K-F	25.4	34.8	46.0	1.2	4	31	480	720	17.3
2.0	941C10W2K-F	29.7	39.1	46.0	1.2	3	33	480	960	21.7

Type 941C, Polypropylene Capacitors, for Pulse, Snubber

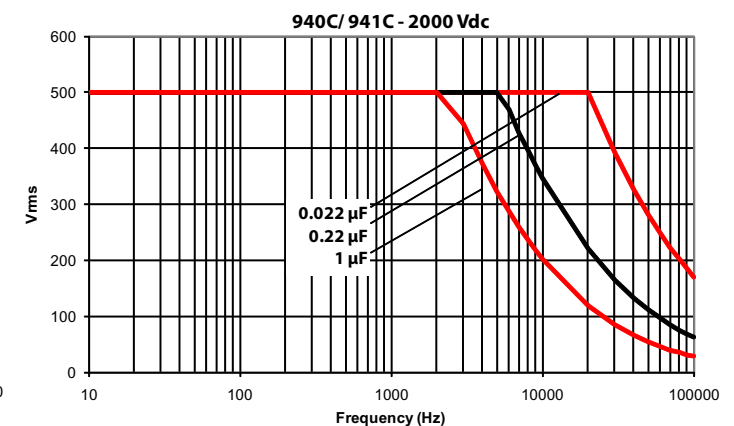
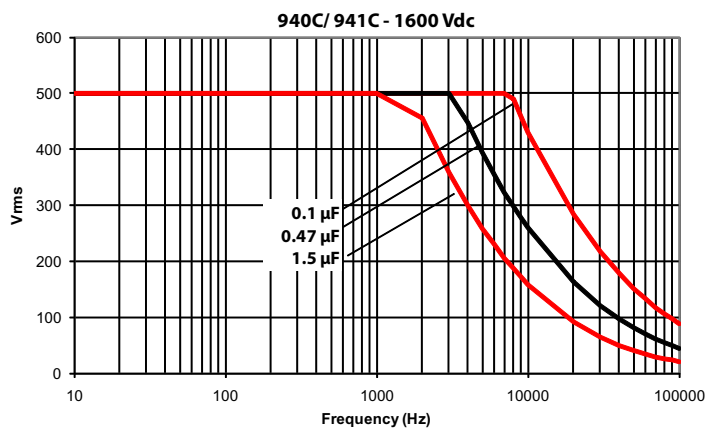
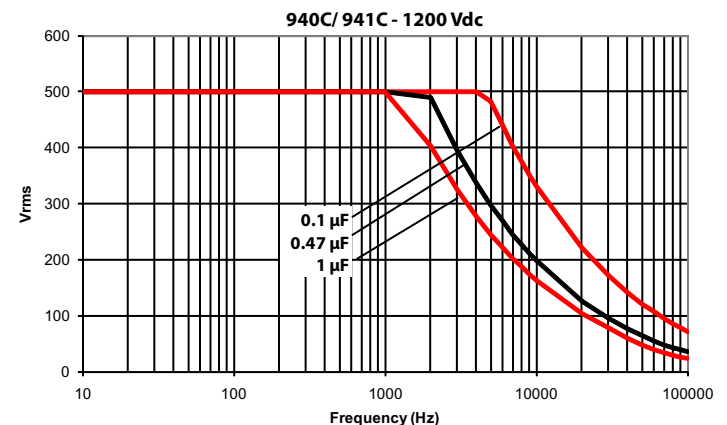
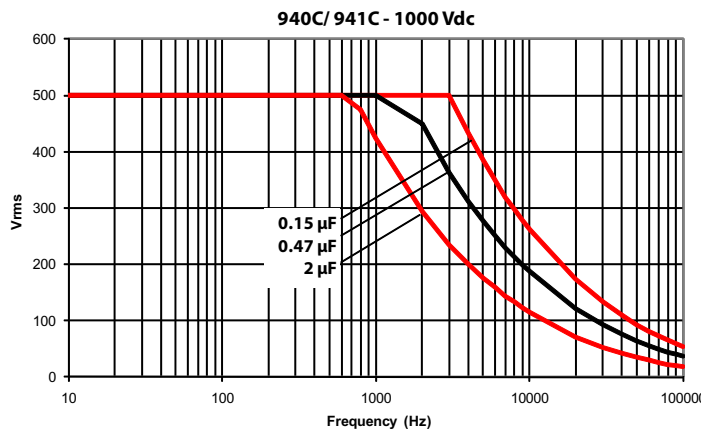
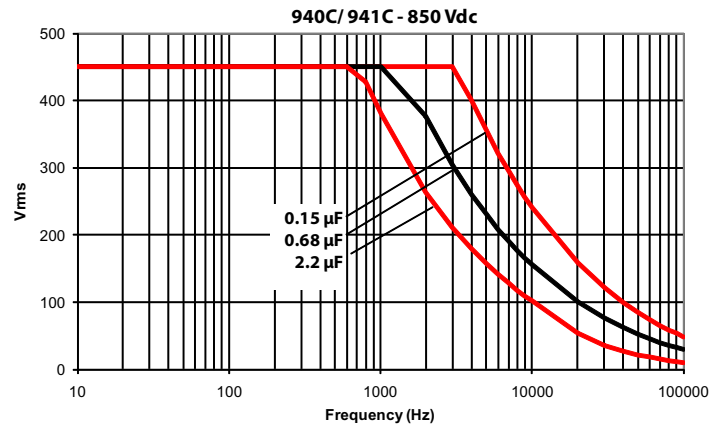
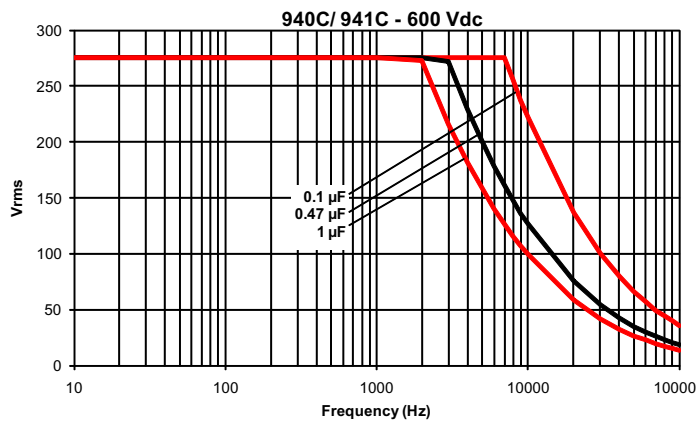
High dV/dt for Snubber Applications

Cap. (μ F)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (m Ω)	Typical ESL (nH)	dV/dt (V/ μ s)	I peak (A)	I_{RMS} 70 °C 100 kHz (A)
1200 Vdc (500 Vac)										
.10	941C12P1K-F	11.7	18.0	34.0	0.8	9	20	1142	114	6.7
.15	941C12P15K-F	14.4	20.7	34.0	1.0	7	21	1142	171	8.3
.22	941C12P22K-F	17.5	23.8	34.0	1.0	7	23	1142	251	9.2
.33	941C12P33K-F	14.6	24.0	46.0	1.0	7	21	640	211	10.0
.47	941C12P47K-F	17.7	27.1	46.0	1.2	7	28	640	301	10.9
.68	941C12P68K-F	21.7	31.1	46.0	1.2	6	30	640	435	13.0
1.0	941C12W1K-F	26.7	36.1	46.0	1.2	5	32	640	640	15.9
1.5	941C12W1P5K-F	27.6	40.2	54.0	1.2	4	36	502	754	19.7
1600 Vdc (500 Vac)										
.10	941C16P1K-F	14.3	20.6	34.0	1.0	7	21	1427	143	8.3
.15	941C16P15K-F	17.7	23.9	34.0	1.0	5	23	1427	214	11.0
.22	941C16P22K-F	21.5	27.8	34.0	1.2	7	24	1427	314	10.3
.33	941C16P33K-F	18.2	27.6	46.0	1.2	7	23	800	264	11.0
.47	941C16P47K-F	22.0	31.4	46.0	1.2	6	30	800	376	13.1
.68	941C16P68K-F	26.9	36.3	46.0	1.2	6	32	800	544	14.5
1.0	941C16W1K-F	33.1	42.5	46.0	1.2	5	35	800	800	17.9
1.5	941C16W1P5K-F	34.5	47.0	54.0	1.2	4	39	628	942	22.2
2000 Vdc (500 Vac)										
.022	941C20S22K-F	7.9	14.2	34.0	0.8	35	18	1712	38	2.8
.033	941C20S33K-F	9.7	16.0	34.0	0.8	20	19	1712	57	4.1
.047	941C20S47K-F	11.6	17.8	34.0	0.8	12	20	1712	80	5.7
.068	941C20S68K-F	14.0	20.2	34.0	1.0	8	21	1712	116	7.7
.10	941C20P1K-F	17.0	23.3	34.0	1.0	7	22	1712	171	9.1
.15	941C20P15K-F	14.1	23.6	46.0	1.0	7	21	960	144	9.8
.22	941C20P22K-F	17.4	26.8	46.0	1.0	8	28	960	211	10.1
.33	941C20P33K-F	21.7	31.2	46.0	1.2	8	30	960	317	11.3
.47	941C20P47K-F	26.3	35.8	46.0	1.2	6	32	960	451	14.4
.56	941C20P56K-F	23.9	36.5	54.0	1.2	7	31	754	422	13.9
.68	941C20P68K-F	26.7	39.2	54.0	1.2	6	35	754	513	15.8
1.0	941C20W1K-F	33.1	45.6	54.0	1.2	5	38	754	754	19.4
3000 Vdc (500 Vac)										
.010	941C30S1K-F	7.8	14.1	34.0	0.8	60	18	2568	26	2.2
.015	941C30S15K-F	9.5	15.8	34.0	0.8	40	19	2568	39	2.9
.022	941C30S22K-F	11.5	17.8	34.0	0.8	25	20	2568	57	4.0
.033	941C30S33K-F	14.2	20.4	34.0	1.0	14	21	2568	85	5.8
.047	941C30S47K-F	11.3	20.7	46.0	1.0	14	20	1440	68	6.3
.068	941C30S68K-F	13.8	23.3	46.0	1.0	12	26	1440	98	7.4
.10	941C30P1K-F	17.1	26.5	46.0	1.2	10	28	1440	144	9.0
.15	941C30P15K-F	21.3	30.7	46.0	1.2	8	30	1440	216	11.2

Type 941C, Polypropylene Capacitors, for Pulse, Snubber

High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications



Type 942 round, axial film capacitors utilize a hybrid section design of polypropylene film, metal foils and metallized polypropylene dielectric to achieve both high peak current as well as superior rms current ratings. This series is ideal for high pulse operation and high peak current circuits.

Highlights

- Very high dV/dt
- Very high pulse current
- Low inductance
- Self Healing

Specifications

Capacitance Range	0.01 to 2.5 μ F
Capacitance Tolerance	$\pm 10\%$ Standard Tolerance
Rated Voltage	600 to 2000 Vdc (300 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 °C to 105 °C* *Full rated voltage at 85 °C - derated linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25°C	150% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

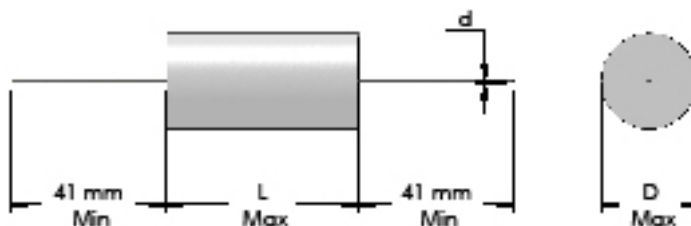
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

Part Numbering System

942	C	6	P	22	K	-F
Series	Termination Code	Voltage Code		Capacitance Significant Figures μF	Tolerance Code	RoHS Compliant Indicator
942	C = Bare Copper Wire	6 = 600 Vdc	12 = 1200 Vdc	S = 0.0	K = $\pm 10\%$	
	F = Insulated Stranded Wire	8 = 850 Vdc	16 = 1600 Vdc	P = 0.		
		10 = 1000 Vdc	20 = 2000 Vdc	W = No decimal point		
	H = Copper Lugs					

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	D mm	L mm	d mm	Typical ESR ($\text{m}\Omega$)	Typical ESL (nH)	dV/dt ($\text{V}/\mu\text{s}$)	I_{PEAK} (A)	I_{RMS} 70 °C 100 kHz (A)
600 Vdc (300 Vac)									
.15	942C6P15K-F	14.0	34.0	1.0	5	21	1427	214	7.7
.22	942C6P22K-F	16.0	34.0	1.0	7	22	1427	314	7.0
.33	942C6P33K-F	19.0	34.0	1.0	6	23	1427	471	8.4
.47	942C6P47K-F	22.0	34.0	1.0	5	24	1427	671	10.1
.68	942C6P68K-F	25.6	34.0	1.2	4	26	1427	970	12.4
1.00	942C6W1K-F	23.5	46.0	1.2	5	30	800	800	11.8
1.50	942C6W1P5K-F	28.5	46.0	1.2	4	32	800	1200	14.8
2.00	942C6W2K-F	28.5	54.0	1.2	3	36	628	1256	18.2
2.20	942C6W2P2K-F	30.0	54.0	1.2	3	36	628	1382	18.8
2.50	942C6W2P5K-F	32.0	54.0	1.2	3	37	628	1570	19.5
850 Vdc (360 Vac)									
.15	942C8P15K-F	15.5	34.0	1.0	5	22	1712	257	8.1
.22	942C8P22K-F	18.0	34.0	1.0	7	23	1712	377	7.5
.33	942C8P33K-F	21.5	34.0	1.0	6	24	1712	565	7.7
.47	942C8P47K-F	25.0	34.0	1.2	5	26	1712	805	10.9
.68	942C8P68K-F	29.5	34.0	1.2	4	27	1712	1164	13.6
1.00	942C8W1K-F	28.0	46.0	1.2	5	32	960	960	13.1
1.50	942C8W1P5K-F	29.0	54.0	1.2	4	36	754	1131	15.9
2.00	942C8W2K-F	29.5	64.0	1.2	3	41	574	1148	19.9
1000 Vdc (400 Vac)									
.10	942C10P1K-F	16.0	34.0	1.0	8	22	2283	228	6.6
.15	942C10P15K-F	19.0	34.0	1.0	7	23	2283	342	7.8
.22	942C10P22K-F	22.5	34.0	1.0	6	24	2283	502	9.3
.33	942C10P33K-F	21.0	46.0	1.0	5	29	1280	422	11.0
.47	942C10P47K-F	24.0	46.0	1.2	5	30	1280	601	11.9
.68	942C10P68K-F	28.5	46.0	1.2	5	32	1280	870	13.3
1.00	942C10W1K-F	30.0	54.0	1.2	5	37	1005	1005	14.6
1.40	942C10W1P4K-F	31.5	64.0	1.2	4	41	765	1071	17.9

Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

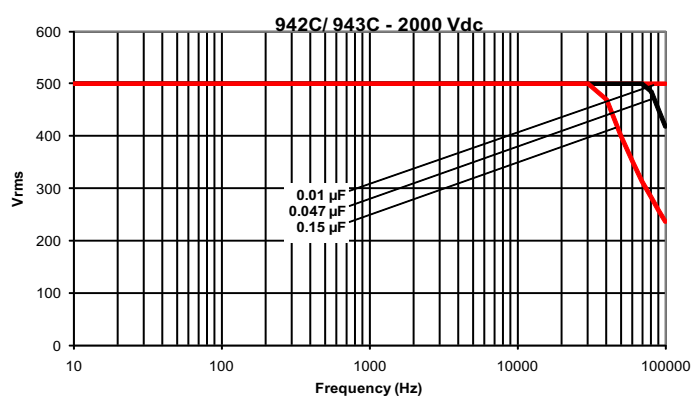
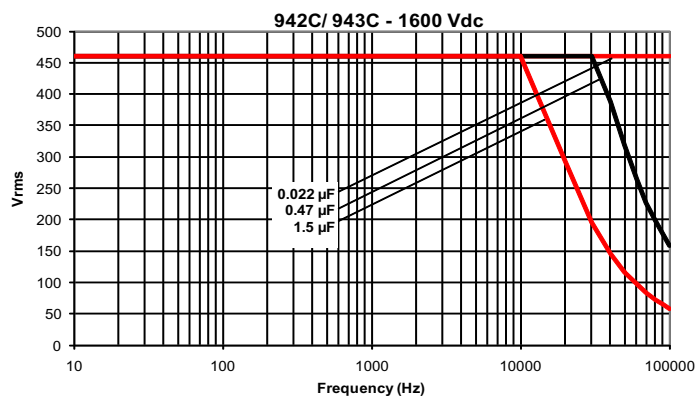
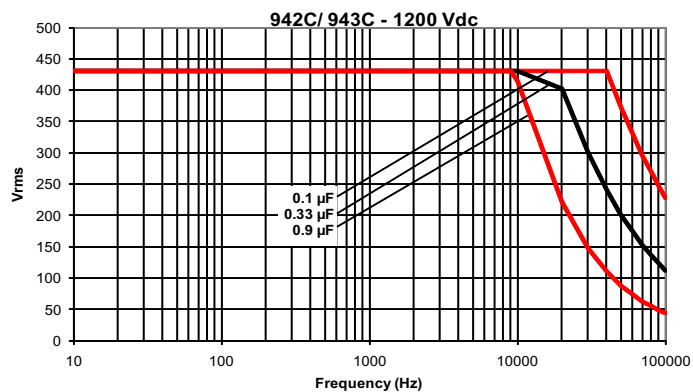
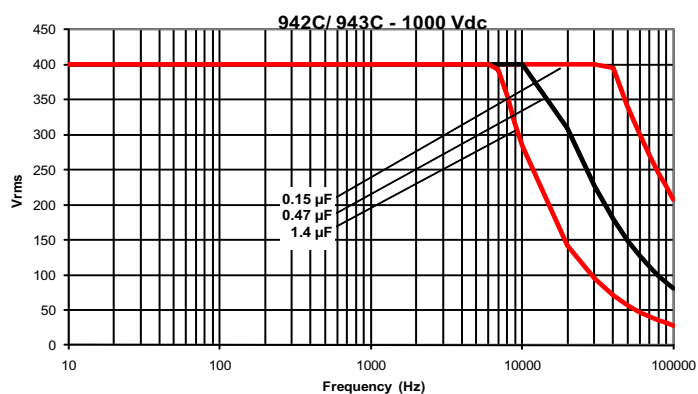
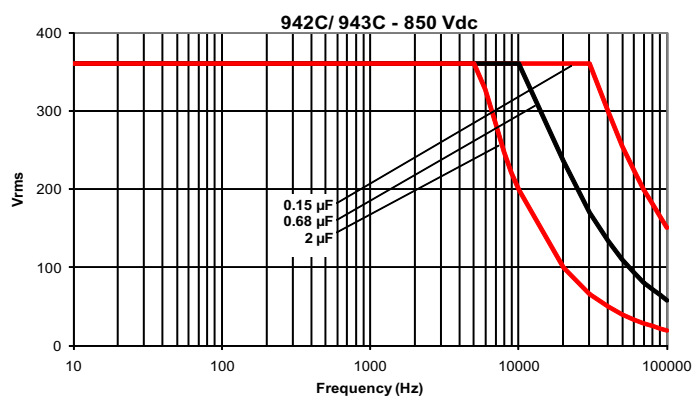
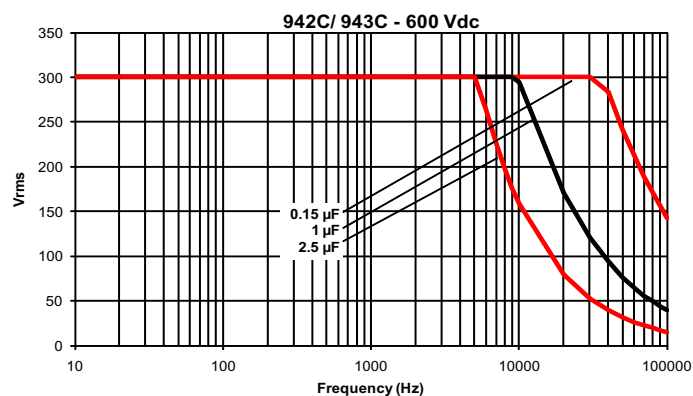
Very High dV/dt for Snubber Applications

Cap. (μ F)	Catalog Part Number	D mm	L mm	d mm	Typical ESR (m Ω)	Typical ESL (nH)	dV/dt (V/ μ s)	I _{PEAK} (A)	I _{RMS} 70 °C 100 kHz (A)
1200 Vdc (430 Vac)									
.10	942C12P1K-F	19.0	34.0	1.0	5	23	2854	285	9.2
.15	942C12P15K-F	22.5	34.0	1.0	5	24	2854	428	10.2
.22	942C12P22K-F	26.5	34.0	1.2	6	26	2854	628	10.3
.33	942C12P33K-F	24.5	46.0	1.2	6	31	1600	528	11.0
.47	942C12P47K-F	29.0	46.0	1.2	5	32	1600	752	13.4
.68	942C12P68K-F	30.5	54.0	1.2	5	37	1256	854	14.7
.90	942C12P9K-F	31.0	64.0	1.2	5	41	957	861	15.9
1600 Vdc (460 Vac)									
.022	942C16S22K-F	12.0	34.0	1.0	27	20	3425	75	3.0
.033	942C16S33K-F	14.5	34.0	1.0	14	21	3425	113	4.7
.047	942C16S47K-F	16.5	34.0	1.0	8	22	3425	161	6.7
.068	942C16S68K-F	19.0	34.0	1.0	6	23	3425	233	8.4
.10	942C16P1K-F	22.5	34.0	1.0	4	24	3425	342	11.4
.15	942C16P15K-F	20.5	46.0	1.0	5	29	1919	288	10.9
.22	942C16P22K-F	23.5	46.0	1.0	5	68	1919	422	11.8
.33	942C16P33K-F	28.5	46.0	1.2	5	32	1919	633	13.3
.47	942C16P47K-F	30.0	54.0	1.2	5	36	1507	708	14.6
.56	942C16P56K-F	28.5	64.0	1.2	5	40	1148	643	15.1
.68	942C16P68K-F	31.5	64.0	1.2	5	42	1148	781	16.0
2000 Vdc (500 Vac)									
.01	942C20S1K-F	12.0	34.0	1.0	50	20	5137	51	2.2
.015	942C20S15K-F	14.5	34.0	1.0	40	21	5137	77	2.8
.022	942C20S22K-F	16.5	34.0	1.0	20	22	5137	113	4.2
.033	942C20S33K-F	19.5	34.0	1.0	12	23	5137	170	6.0
.047	942C20S47K-F	18.0	46.0	1.0	10	28	2879	135	7.1
.068	942C20S68K-F	20.5	46.0	1.0	6	29	2879	196	9.9
.10	942C20P1K-F	24.5	46.0	1.2	5	30	2879	288	12.1
.15	942C20P15K-F	29.5	46.0	1.2	5	32	2879	432	13.5

Type 942C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

Type 943 oval, axial film capacitors utilize a hybrid section design of polypropylene film, metal foils and metallized polypropylene dielectric to achieve both high peak current as well as superior rms current ratings. This series is ideal for high pulse operation and high peak current circuits.



Highlights

- Very high dV/dt
- Very high pulse current
- Low inductance
- Self Healing

Specifications

Capacitance Range	0.01 to 2.5 μ F
Capacitance Tolerance	$\pm 10\%$ Standard Tolerance
Rated Voltage	600 to 2000 Vdc (300 to 500 Vac, 60 Hz)
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 105 $^{\circ}$ C* *Full rated voltage at 85 $^{\circ}$ C - derated linearly to 50% rated at 105 $^{\circ}$ C
Maximum rms Current	Check tables for values
Insulation Resistance	> 100,000 M Ω x μ F
Test Voltage between Terminals @ 25 $^{\circ}$ C	150% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 $^{\circ}$ C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 hours @ 85 $^{\circ}$ C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 $^{\circ}$ C 30,000 h @ rated Vac, 70 $^{\circ}$ C
RoHS Compliant	

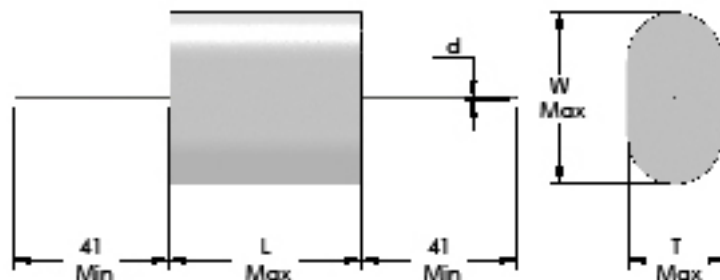
Dimensions

Construction Diagram



Construction Details

Case Material	UL510 Polyester Tape Wrap
Resin Material	UL94V-0 Epoxy Fill
Terminal Material	Tin Plated Copper



Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

Part Numbering System

943	C	6	P	22	K	-F	
				Capacitance		RoHS	
Series	Termination Code	Voltage Code		Capacitance Decimal Point	Significant Figures in μF	Tolerance Code	Compliant Indicator
943	C = Bare Copper Wire	6 = 600 Vdc	16 = 1600 Vdc	S = 0.0		J = $\pm 5\%$	
	F = Insulated Stranded Wire	8 = 850 Vdc	20 = 2000 Vdc	P = 0.		H = $\pm 6\%$	
		10 = 1000 Vdc	30 = 3000 Vdc	W = No decimal point		K = $\pm 10\%$	
	H = Tinned Lugs	12 = 1200 Vdc				M = $\pm 20\%$	

Ratings

NOTE: Other capacitance values, sizes and performance specifications are available. Contact us.

Cap. (μF)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (mΩ)	Typical ESL (nH)	dV/dt (V/μs)	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
600 Vdc (300 Vac)										
.15	943C6P15K-F	12.3	17.0	34.0	1.0	5	19	1427	214	8.9
.22	943C6P22K-F	14.3	19.0	34.0	1.0	7	20	1427	314	8.1
.33	943C6P33K-F	17.1	21.8	34.0	1.0	6	22	1427	471	9.6
.47	943C6P47K-F	19.9	24.6	34.0	1.0	5	23	1427	671	11.4
.68	943C6P68K-F	23.5	28.3	34.0	1.2	4	24	1427	970	14.1
1.00	943C6W1K-F	19.2	28.6	46.0	1.2	5	28	800	800	13.4
1.50	943C6W1P5K-F	23.5	32.9	46.0	1.2	4	30	800	1200	16.6
2.00	943C6W2K-F	24.0	33.5	54.0	1.2	3	33	628	1256	20.6
2.20	943C6W2P2K-F	25.2	34.6	54.0	1.2	3	34	628	1382	21.1
2.50	943C6W2P5K-F	27.0	36.5	54.0	1.2	3	35	628	1570	21.9
850 Vdc (360 Vac)										
.15	943C8P15K-F	13.9	18.6	34.0	1.0	5	20	1712	257	9.4
.22	943C8P22K-F	16.4	21.0	34.0	1.0	7	21	1712	377	8.7
.33	943C8P33K-F	19.5	24.2	34.0	1.0	6	23	1712	565	10.3
.47	943C8P47K-F	22.9	27.6	34.0	1.2	5	24	1712	805	12.4
.68	943C8P68K-F	27.1	31.8	34.0	1.2	4	26	1712	1164	15.3
1.00	943C8W1K-F	22.4	31.8	46.0	1.2	5	29	960	960	14.5
1.50	943C8W1P5K-F	24.3	33.7	54.0	1.2	4	34	754	1131	18.0
2.00	943C8W2K-F	24.7	34.2	64.0	1.2	3	38	574	1147	22.4
1000 Vdc (400 Vac)										
.10	943C10P1K-F	14.4	19.2	34.0	1.0	8	20	2283	228	7.6
.15	943C10P15K-F	17.2	21.9	34.0	1.0	7	22	2283	342	8.9
.22	943C10P22K-F	20.4	25.1	34.0	1.0	6	23	2283	502	10.6
.33	943C10P33K-F	16.6	26.0	46.0	1.0	5	27	1280	422	12.5
.47	943C10P47K-F	19.7	29.1	46.0	1.2	5	28	1280	601	13.6
.68	943C10P68K-F	23.7	33.1	46.0	1.2	5	30	1280	870	14.9
1.00	943C10W1K-F	25.4	34.9	54.0	1.2	5	34	1005	1005	16.5
1.40	943C10W1P4K-F	26.3	36.0	64.0	1.2	4	39	765	1071	20.1

Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

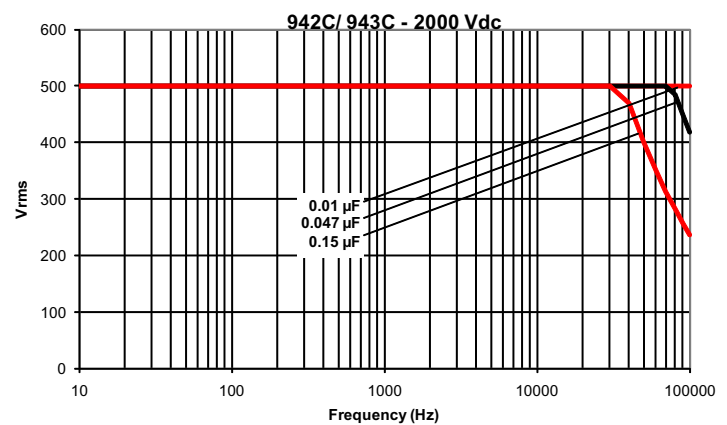
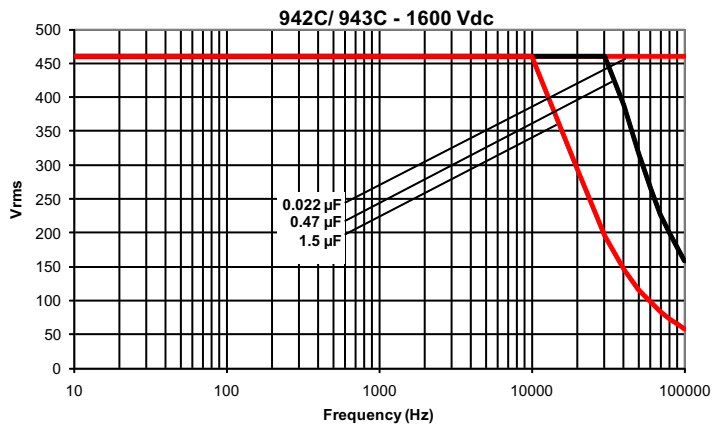
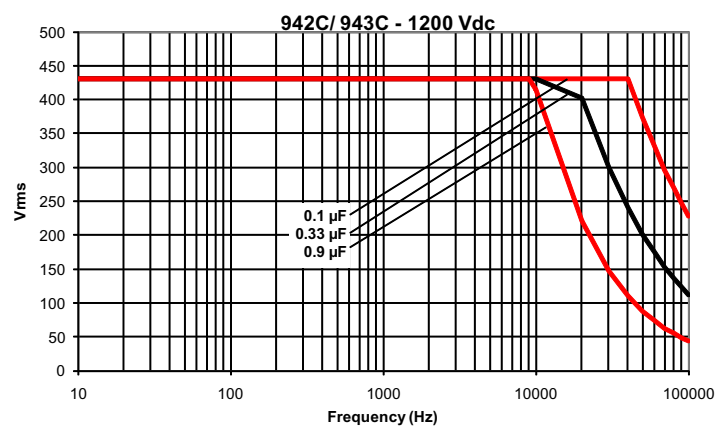
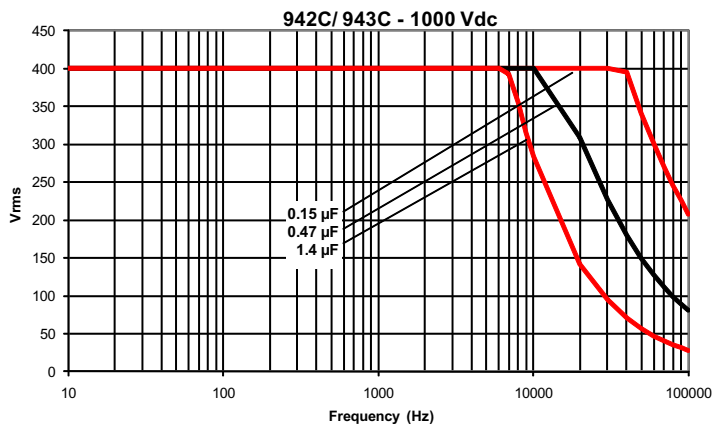
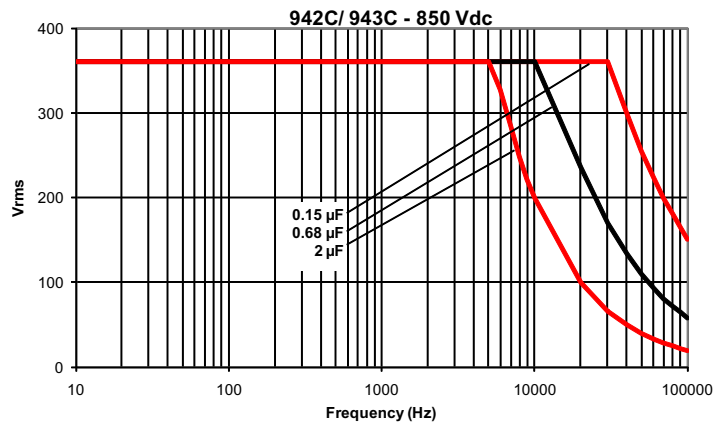
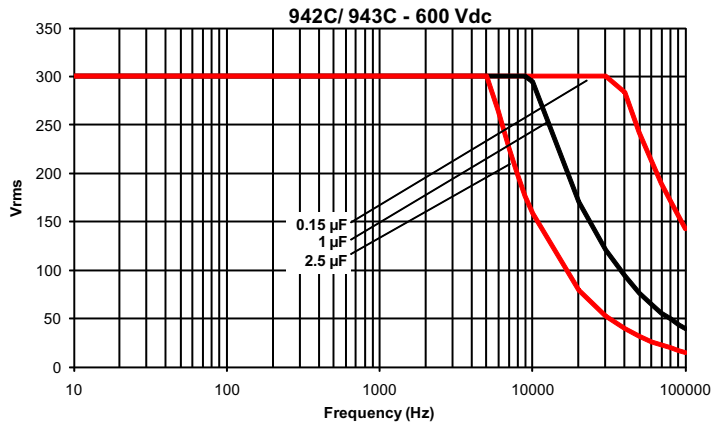
Very High dV/dt for Snubber Applications

Cap. (μ F)	Catalog Part Number	T mm	W mm	L mm	d mm	Typical ESR (m Ω)	Typical ESL (nH)	dV/dt (V/ μ s)	I peak (A)	I _{RMS} 70 °C 100 kHz (A)
1200 Vdc (430 Vac)										
.1	943C12P1K-F	17.1	21.8	34.0	1.0	5	22	2854	285	10.5
.15	943C12P15K-F	20.5	25.2	34.0	1.0	5	23	2854	428	11.6
.22	943C12P22K-F	24.4	29.1	34.0	1.2	6	25	2854	628	11.7
.33	943C12P33K-F	20.2	29.6	46.0	1.2	6	28	1600	528	12.5
.47	943C12P47K-F	24.0	33.4	46.0	1.2	5	30	1600	752	15.0
.68	943C12P68K-F	25.6	35.0	54.0	1.2	5	36	1256	854	16.5
.90	943C12P9K-F	25.7	35.1	64.0	1.2	5	39	956	860	17.7
1600 Vdc (460 Vac)										
.022	943C16S22K-F	10.6	15.3	34.0	1.0	27	19	3425	75	3.5
.033	943C16S33K-F	12.4	17.1	34.0	1.0	14	20	3425	113	5.3
.047	943C16S47K-F	14.3	19.0	34.0	1.0	8	20	3425	161	7.6
.068	943C16S68K-F	16.7	21.4	34.0	1.0	6	21	3425	233	9.5
.10	943C16P1K-F	19.8	24.5	34.0	1.0	4	23	3425	342	12.8
.15	943C16P15K-F	16.1	25.5	46.0	1.0	5	26	1919	288	12.3
.22	943C16P22K-F	19.4	28.8	46.0	1.0	5	28	1919	422	13.5
.33	943C16P33K-F	23.7	33.2	46.0	1.2	5	30	1919	633	14.9
.47	943C16P47K-F	25.1	34.5	54.0	1.2	5	34	1507	708	16.3
.56	943C16P56K-F	24.3	33.7	64.0	1.2	5	38	1147	642	17.2
.68	943C16P68K-F	26.6	36.0	64.0	1.2	5	40	1147	780	18.0
2000 Vdc (500 Vac)										
.010	943C20S1K-F	10.4	15.1	34.0	1.0	50	19	5137	51	2.6
.015	943C20S15K-F	12.2	16.9	34.0	1.0	40	19	5137	77	3.1
.022	943C20S22K-F	14.2	19.0	34.0	1.0	20	20	5137	113	4.8
.033	943C20S33K-F	16.9	21.6	34.0	1.0	12	22	5137	170	6.8
.047	943C20S47K-F	13.3	22.8	46.0	1.0	10	25	2879	135	8.0
.068	943C20S68K-F	15.8	25.3	46.0	1.0	6	26	2879	196	11.2
.10	943C20P1K-F	19.1	28.5	46.0	1.2	5	28	2879	288	14.9
.15	943C20P15K-F	23.3	32.7	46.0	1.2	5	30	2879	432	15.5

Type 943C, Polypropylene Capacitors, for High Pulse, Snubber

Very High dV/dt for Snubber Applications

RMS Voltage vs Frequency @ 25 °C



Type SCD IGBT Snubber Capacitor Modules

High dV/dt Direct Mount IGBT Snubber



Style SCD offers protection against voltage transients in low to medium current IGBT applications where high dV/dt is encountered. Connect these capacitors from C1 to E2 on a dual IGBT module or from P to N on a six-pack module to eliminate severe voltage transients. Parts ending with Z25 fit IGBTs with 23mm, 25mm and 28mm lead spacing. If you have a preferred lead spacing, please specify.

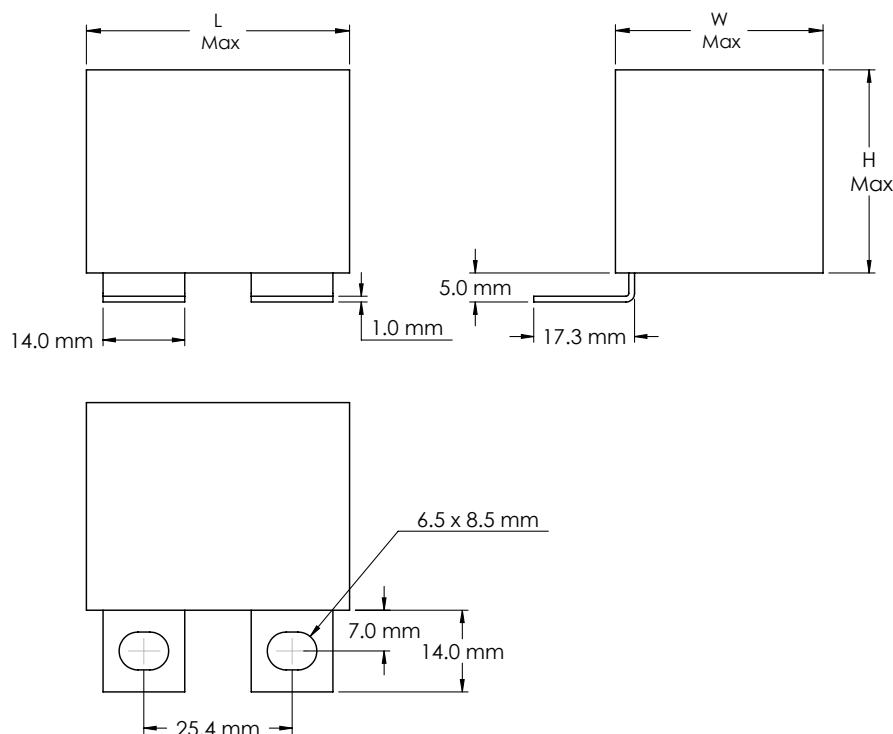
Highlights

- High peak & RMS current capability
- Mount directly to the IGBT module
- Low inductance <20nH
- Low loss polypropylene dielectric
- Self healing
- Other terminal spacing and capacitance values available.
- We can build to your specs!
- 85 °C ambient temperature

Specifications

Capacitance Range	0.22 to 4.7 μ F
Capacitance Tolerance	$\pm$ 10% (K) standard, $\pm$ 5% (J) optional
Rated Voltage	600 to 2000 Vdc
Operating Temperature Range with Ripple	-55 °C to 85 °C
Maximum rms Current	Check tables for values
Test Voltage between Terminals @ 25°C	160% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25°C	3 kVac @ 50/60 Hz for 60 s
Life Test	2000 h @ 85 °C, 125% rated DC voltage
Life Expectancy	60,000 h @ rated Vdc, 70 °C 30,000 h @ rated Vac, 70 °C
RoHS Compliant	

Dimensions



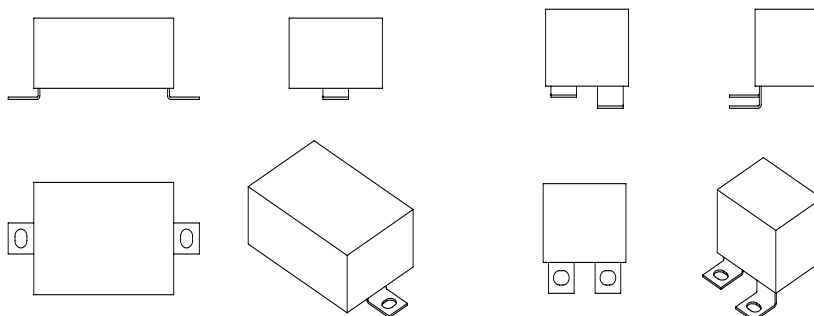
Construction Details	
Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Copper

Type SCD IGBT Snubber Capacitor Modules

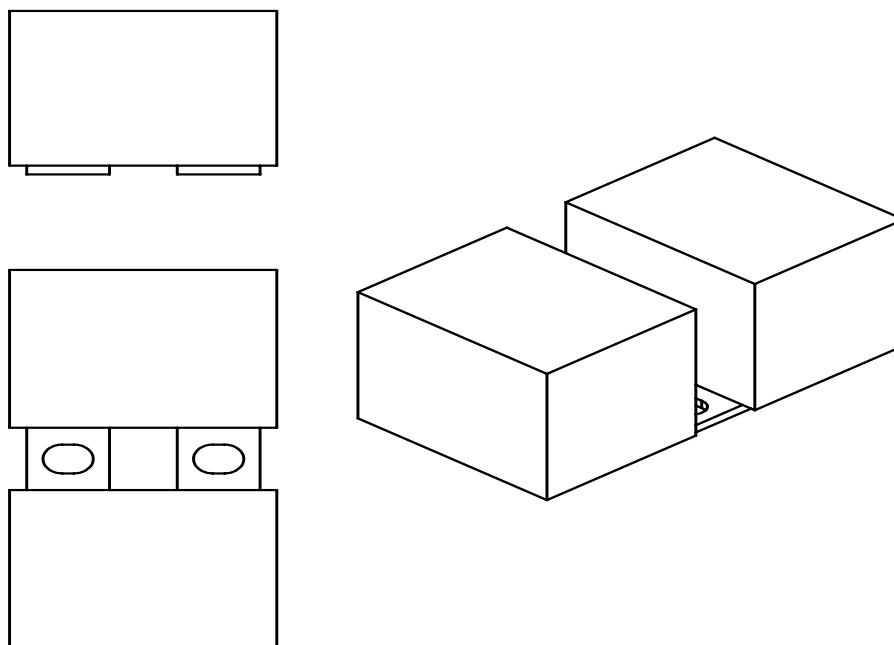
High dV/dt Direct Mount IGBT Snubber

Mounting Across the Bus?

CDE Will Accommodate Your Bus Structure



Dual Snubber Assembly Option



Part Numbering System

SCD	105	K	122	A	3	-	25	-F
Series Type Designation	Capacitance in pF	Tolerance Code	Voltage	Internal Assembly Code	Type of Section to be used	Lug Configuration	Lug Spacing	RoHS Compliant Indicator
	104 = 0.1 μ F	J = $\pm$ 5%	601 = 600 Vdc			Z = Standard	22 = 22 mm	
	105 = 1 μ F	K = $\pm$ 10%	122 = 1200 Vdc			25.4 mm C-C	24 = 24 mm	
	225 = 2.2 μ F		202 = 2000 Vdc				25 = 25 mm	
							28 = 28 mm	
							29 = 29 mm	

Type SCD IGBT Snubber Capacitor Modules

High dV/dt Direct Mount IGBT Snubber

Ratings

Note: Other ratings, sizes and performance specification available upon request. Contact us.

Catalog Part Number			Volts		Irms 100 kHz					
	Cap.	Volts	60 Hz	dV/dt	Ipk	ESR	55 °C	W	L	H
	(μF)	(Vdc)	(Vac)	(V/μs)	(A)	(mΩ)	(Arms)	(mm)	(mm)	(mm)
600 Vdc										
SCD474K601A3Z25-F	0.47	600	275	250	118	9	9.2	24.6	47.0	24.1
SCD684K601A3Z25-F	0.68	600	275	250	170	7	11.5	29.0	47.0	26.7
SCD105K601A3Z25-F	1.00	600	275	200	200	5	14.0	29.0	47.0	26.7
SCD155K601A3Z25-F	1.50	600	275	150	225	4	17.1	29.0	47.0	26.7
SCD205K601A3Z25-F	2.00	600	275	150	300	3	20.7	32.3	45.1	35.6
SCD335K601D3Z25-F	3.30	600	400	300	825	5	35.0	38.1	52.1	38.1
SCD475K601D3Z25-F	4.70	600	400	250	1175	4	46.2	46.4	56.5	50.2
1000 Vdc										
SCD474K102A3Z25-F	0.47	1000	275	250	118	11	9.2	24.6	47.0	24.1
SCD474K102D3Z25-F	0.47	1000	500	700	329	8	12.1	29.0	47.0	26.7
SCD684K102A3Z25-F	0.68	1000	275	200	136	7	11.5	29.0	47.0	26.7
SCD684K102D3Z25-F	0.68	1000	500	500	340	7	14.4	29.0	47.0	26.7
SCD105K102A3Z25-F	1.00	1000	275	200	200	4	14.0	29.0	47.0	26.7
SCD105K102D3Z25-F	1.00	1000	500	400	400	5	17.5	29.0	47.0	26.7
SCD155K102A3Z25-F	1.50	1000	275	160	240	4	17.9	32.3	45.1	35.6
SCD155K102D3Z25-F	1.50	1000	500	400	600	3	22.4	34.8	45.1	35.6
SCD205K102A3Z25-F	2.00	1000	275	160	320	4	20.9	34.8	45.1	35.6
SCD205K102D3Z25-F	2.00	1000	500	400	800	5	26.2	38.1	52.1	38.1
1200 Vdc										
SCD224K122A3Z25-F	0.22	1200	500	650	143	19	7.9	24.6	47.0	24.1
SCD334K122A3Z25-F	0.33	1200	500	650	215	13	10.0	29.0	47.0	26.7
SCD474K122A3Z25-F	0.47	1200	500	500	235	10	12.0	29.0	47.0	26.7
SCD684K122A3Z25-F	0.68	1200	500	500	340	7	15.1	32.3	45.1	35.6
SCD105K122A3Z25-F	1.00	1200	500	500	500	5	18.5	34.8	45.1	35.6
SCD155K122A3Z25-F	1.50	1200	500	400	600	4	23.9	38.1	52.1	38.1
SCD205K122A3Z25-F	2.00	1200	500	400	800	4	30.1	46.4	56.5	50.2
SCD305K122C3Z25-F	3.00	1200	500	400	1200	5	39.7	76.2	62.9	38.1
1600 Vdc										
SCD224K162A3Z25-F	0.22	1600	500	650	143	19	7.9	24.6	47.0	24.1
SCD334K162A3Z25-F	0.33	1600	500	650	215	12	10.0	29.0	47.0	26.7
SCD474K162A3Z25-F	0.47	1600	500	650	306	10	12.6	32.3	45.1	35.6
SCD684K162A3Z25-F	0.68	1600	500	650	442	7	15.3	34.8	45.1	35.6
SCD105K162A3Z25-F	1.00	1600	500	500	500	6	19.5	38.1	52.1	38.1
SCD155K162A3Z25-F	1.50	1600	500	400	600	5	25.6	41.9	68.6	38.1
SCD205K162A3Z25-F	2.00	1600	500	400	800	5	30.6	44.5	66.7	46.4
2000 Vdc										
SCD224K202A3Z25-F	0.22	2000	500	800	176	19	8.2	24.6	47.0	24.1
SCD334K202A3Z25-F	0.33	2000	500	800	264	13	10.5	32.3	45.1	35.6
SCD474K202A3Z25-F	0.47	2000	500	600	282	10	13.0	34.3	55.9	30.5
SCD684K202A3Z25-F	0.68	2000	500	600	408	8	16.1	38.1	52.1	38.1
SCD105K202A3Z25-F	1.00	2000	500	600	600	6	21.3	46.4	56.5	50.2

Note: Modify Catalog Part Number to specify lead spacing. Example: 44mm spacing would use -44 instead of Z25. Other capacitance values and lead orientations are available. Contact us.

CDE Cornell Dubilier • 1605 E. Rodney French Blvd. • New Bedford, MA 02744 • Phone: (508)996-8561 • Fax: (508)996-3830

Type SCM Single/Dual IGBT Snubber Capacitor Modules

High Peak Current Snubber with Integrated Hyperfast Diode



Use style SCM as a discharge restrictive de-coupling to protect dual IGBT modules from overvoltage, Figure 1. Style SCM may also be used as an "N" or "P" type snubber component for a clamp snubber where single IGBT modules are used, figure 2.

Highlights

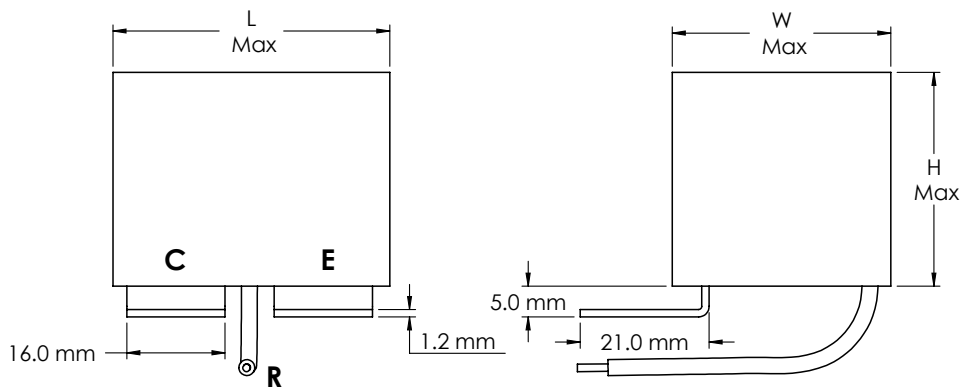
- Direct mount to the IGBT module
- Low inductance
- Low Loss
- Hyperfast diodes integrated into package
- Self healing
- Other terminal spacing, capacitance values and voltage ratings, also available upon request.

Specifications

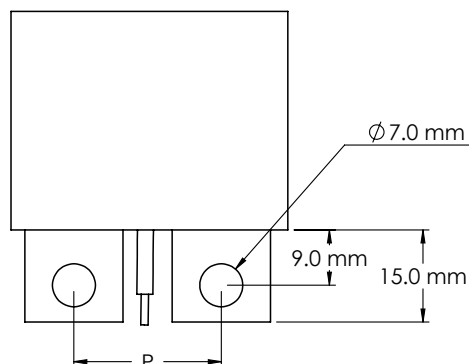
Capacitance Range	0.47 to 2.0 µF
Capacitance Tolerance	±10% (K) standard, ±5% (J) optional
Rated Voltage	600 to 1200 Vdc
Operating Temperature Range with Ripple	-55 °C to 70 °C
RoHS Compliant	

Dimensions

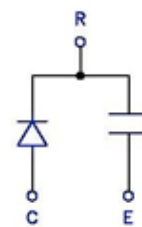
Construction Details	
Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Copper



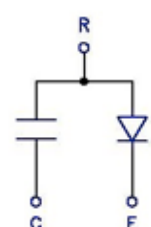
Wire: UL1015
AWG 18
200 mm Min



N Type



P Type



Type SCM Single/Dual IGBT Snubber Capacitor Modules

High Peak Current Snubber with Integrated Hyperfast Diode

Part Numbering System

SCM	105	K	122	H1	N	24	-F
Series Type Designation	Capacitance in μF	Tolerance Code	Voltage	Diode Rating	Polarity	Lug Spacing	RoHS Compliant Indicator
	104=0.1 μF	J = $\pm 5\%$	601 = 600 Vdc		N or P Type	24=24mm	
	105=1 μF	K = $\pm 10\%$	122 = 1200 Vdc			28=28mm	
	225=2.2 μF		202 = 2000 Vdc			29=29mm	

Ratings

Note: Other ratings, sizes and performance specification available upon request. Contact us.

Typical Application						Diode Characteristics									
IGBT Module											Dimensions				
Catalog	Cap	S=Single	Ic	Vce		Vrrm	If	Trr	Ipk surge	Ipk rep	W	L	H	P	
Part Number	(μF)	D=Dual	(A)	(V)	Type	(V)	(A)	(μs)	(A)	(A)	(mm)	(mm)	(mm)	(mm)	
SCM474K601H7N29-F	0.47	S	200–300	600	N	600	30	0.040	300	70	43.82	55.88	34.04	29	
SCM474K601H7P29-F	0.47	S	200–300	600	P	600	30	0.040	300	70	43.82	55.88	34.04	29	
SCM105K601H7N24-F	1.00	D	100–200	600	N	600	30	0.040	300	70	38.10	47.63	31.75	24	
SCM105K601H7P24-F	1.00	D	100–200	600	P	600	30	0.040	300	70	38.10	47.63	31.75	24	
SCM105K601H5N29-F	1.00	S	300–400	600	N	600	50	0.045	500	100	46.36	56.52	38.10	29	
SCM105K601H5P29-F	1.00	S	300–400	600	P	600	50	0.045	500	100	46.36	56.52	38.10	29	
SCM155K601H7N24-F	1.50	D	200–300	600	N	600	30	0.040	300	70	34.29	55.88	30.48	24	
SCM155K601H7P24-F	1.50	D	200–300	600	P	600	30	0.040	300	70	38.10	47.63	31.75	24	
SCM205K601H5N24-F	2.00	D	300–400	600	N	600	50	0.045	500	100	43.82	55.88	34.04	24	
SCM205K601H5P24-F	2.00	D	300–400	600	P	600	50	0.045	500	100	43.82	55.88	34.04	24	
SCM205K601H2N29-F	2.00	S	400–600	600	N	600	100	0.050	1000	200	46.36	56.52	38.10	29	
SCM205K601H2P29-F	2.00	S	400–600	600	P	600	100	0.050	1000	200	46.36	56.52	38.10	29	
SCM474K122H8N29-F	0.47	S	200–300	1200	N	1200	30	0.065	300	60	34.29	55.88	30.48	29	
SCM474K122H8P29-F	0.47	S	200–300	1200	P	1200	30	0.065	300	60	38.10	47.63	31.75	29	
SCM105K122H8N24-F	1.00	D	100–200	1200	N	1200	30	0.065	300	60	44.45	63.50	37.34	24	
SCM105K122H8P24-F	1.00	D	100–200	1200	P	1200	30	0.065	300	60	44.45	63.50	37.34	24	
SCM105K122H4N29-F	1.00	S	300–400	1200	N	1200	50	0.085	500	100	43.82	55.88	34.04	29	
SCM105K122H4P29-F	1.00	S	300–400	1200	P	1200	50	0.085	500	100	46.36	56.52	38.10	29	
SCM155K122H8N24-F	1.50	D	200–300	1200	N	1200	30	0.065	300	60	44.45	63.50	37.34	24	
SCM155K122H8P24-F	1.50	D	200–300	1200	P	1200	30	0.065	300	60	46.36	56.52	38.10	24	
SCM205K122H4N24-F	2.00	D	300–400	1200	N	1200	50	0.065	500	100	53.98	63.50	43.18	24	
SCM205K122H4P24-F	2.00	D	300–400	1200	P	1200	50	0.065	500	100	53.98	63.50	43.18	24	
SCM205K122H1N29-F	2.00	S	400–600	1200	N	1200	100	0.090	1000	200	53.98	63.50	43.18	29	
SCM205K122H1P29-F	2.00	S	400–600	1200	P	1200	100	0.090	1000	200	53.98	63.50	43.18	29	
Ipk surge at 25 °C and Ipk repetitive at 25 °C and 20 kHz.															

Type SCM Single/Dual IGBT Snubber Capacitor Modules

High Peak Current Snubber with Integrated Hyperfast Diode

Typical Applications

Discharge Restrictive De-coupling

The circuit in Figure 1 operates on the same principles as the de-coupling capacitor, but only during turn-off switching. As the IGBT turns off, energy trapped in the loop inductance is transferred to the capacitor. The diode blocks oscillations from occurring and excess charge on the capacitor is discharged through the external resistor.

- 1 or 2 wire taps for connecting external resistor
- Flame resistant case and epoxy, meets UL 94V0
- Other terminal pitches and capacitance values available.

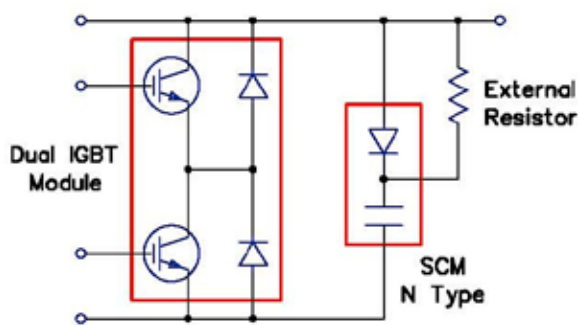


Figure 1
Style SCM Discharge restrictive decoupling used
to protect dual IGBT modules

RCD Clamp

The function of this snubber is similar to a clamp, Figure 2. At turn-off, the snubber diode is forward biased and the snubber is activated. The energy trapped in the stray inductance is absorbed by the snubber capacitor. During turn-on the snubber caps that were fully charged to bus voltage have a discharge path through the forward biased free-wheel diode, the IGBT, and the snubber resistors. This reduces the reverse recovery voltage transient.

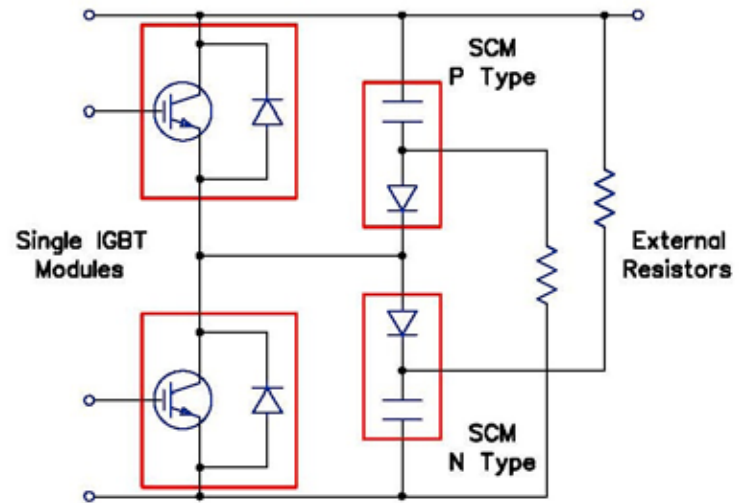
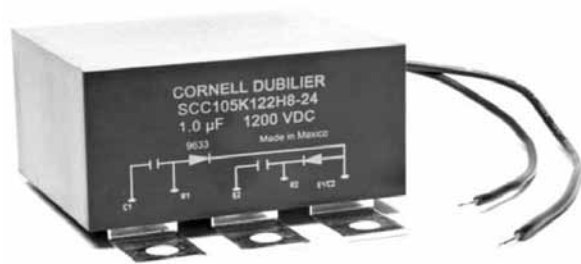


Figure 2
Style SCM "P" type and "N" type used as a clamp to protect
an inverter using two "single" IGBT modules

Type SCC, Dual IGBT Clamp-Snubber Modules

High Peak Current Snubber with Integrated Hyperfast Diodes



Style SCC is ideal for use in medium to high current applications where a dual IGBT module is used. This low loss snubber directly reduces turn-off voltage overshoots and is effective in reducing turn-on voltage transients.

Highlights

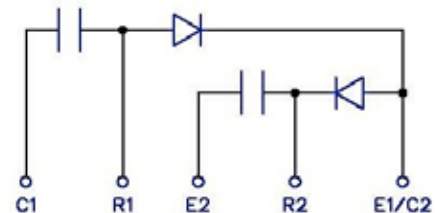
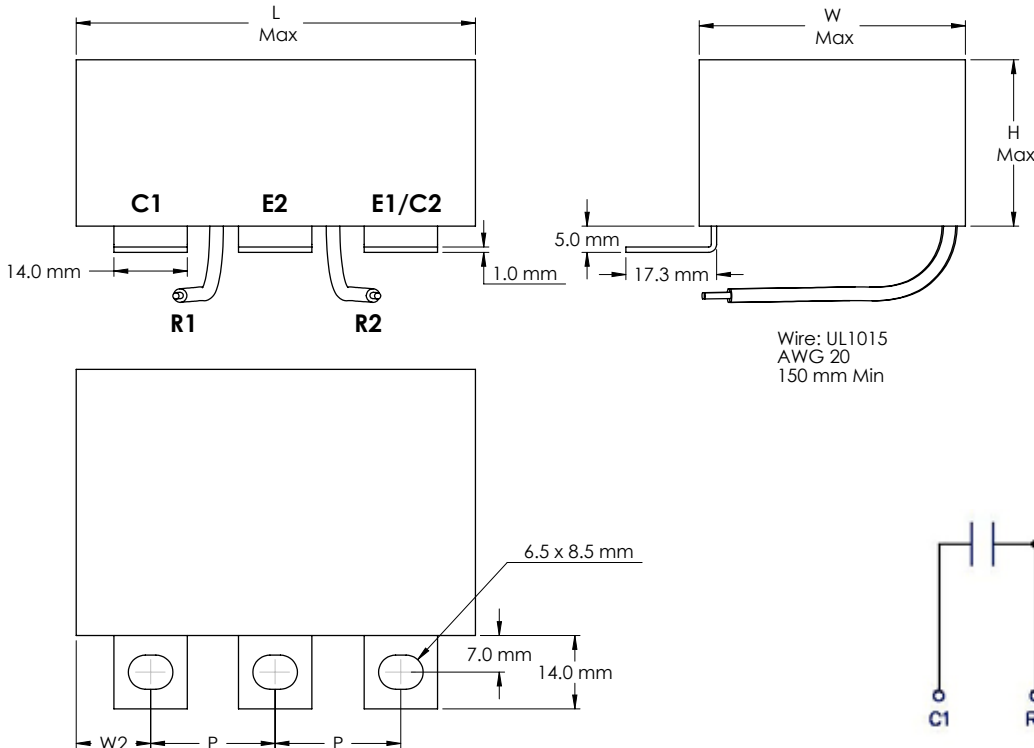
- Mount directly to the IGBT module
- Low inductance
- Low loss polypropylene dielectric
- High peak current
- Hyperfast diodes integrated into package
- Wire taps for connecting external resistors
- Flame resistant case and epoxy meet UL 94V-0

Specifications

Capacitance Range	0.47 to 2.0 μ F
Capacitance Tolerance	$\pm 10\%$ (K) standard, $\pm 5\%$ (J) optional
Rated Voltage	600 to 1200 Vdc
Operating Temperature Range with Ripple	-55 $^{\circ}$ C to 70 $^{\circ}$ C
RoHS Compliant	

Dimensions

Construction Details	
Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Copper



Type SCC, Dual IGBT Clamp-Snubber Modules

High Peak Current Snubber with Integrated Hyperfast Diodes

Part Numbering System

SCC	105	K	122	H1	24	-F
Series Type Designation	Capacitance in pF	Tolerance Code	Voltage	Diode Rating	Lug Spacing	RoHS Compliant Indicator
	104 = 0.1 μ F	J = $\pm$ 5%	601 = 600 Vdc	See Tables	24 = 24 mm	
	105 = 1 μ F	K = $\pm$ 10%	122 = 1200 Vdc		28 = 28 mm	

Ratings

Note: Other ratings, sizes and performance specification available upon request. Contact us.

Catalog Part Number	Typical Application		Diode		Ipk(A) Tc = 25 °C					
	Cap	DUAL IGBT	Characteristics	Ipk(A) Surge	Repetitive	W	2	H	W2	P
	(μF)	Ic/Vce	Vrrm/I _f /trr(μs)	Tc = 25 °C	20 kHz Sq Wave	(mm)	(mm)	(mm)	(mm)	(mm)
SCC105K601H7-24-F	1.00	100/600	600/30/.040	300	70	50.80	76.20	31.75	14.22	24
SCC155K601H7-24-F	1.50	200-300/600	600/30/.040	300	70	50.80	76.20	31.75	14.22	24
SCC205K601H5-24-F	2.00	400/600	600/50/.045	500	100	50.80	76.20	31.75	14.22	24
SCC205K601H5-28-F	2.00	400/600	600/50/.045	500	100	50.80	76.20	31.75	10.16	28
SCC474K122H8-24-F	0.47	100/1200	1200/30/.065	300	60	50.80	76.20	31.75	14.22	24
SCC474K122H8-28-F	0.47	100/1200	1200/30/.065	300	60	50.80	76.20	31.75	10.16	28
SCC105K122H8-24-F	1.00	150/1200	1200/30/.065	300	60	62.90	76.20	38.10	14.22	24
SCC105K122H8-28-F	1.00	150/1200	1200/30/.065	300	60	62.90	76.20	38.10	10.16	28
SCC155K122H4-24-F	1.50	200/1200	1200/50/.085	500	100	63.50	88.90	40.00	20.60	24
SCC155K122H4-28-F	1.50	200/1200	1200/50/.085	500	100	63.50	88.90	40.00	16.50	28
SCC205K122H4-24-F	2.00	300/1200	1200/50/.085	500	100	71.12	92.08	43.18	20.60	24
SCC205K122H4-28-F	2.00	300/1200	1200/50/.085	500	100	71.12	92.08	43.18	18.03	28

Type UNL, DC Link and Filter Capacitors

High Capacitance, High Current, Board Mount



Constructed using a low-loss polypropylene film, the UNL series offers high ripple current capabilities and high capacitance values making them ideal for electrolytic bank replacement and high ripple current applications.

Highlights

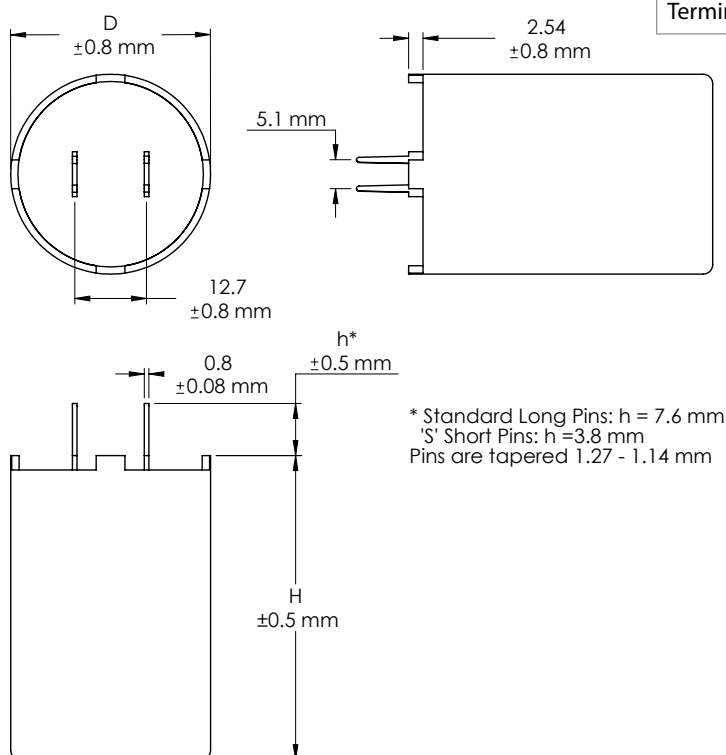
Advantages over Electrolytics

- Exceptionally low ESR
- Up to 10 times the ripple current
- Non-polar
- Higher voltage ratings
- Dry construction - no electrolyte
- Improved reliability

Specifications

Capacitance Range	4.7 to 100 μ F
Capacitance Tolerance	$\pm 10\%$ (K) standard, $\pm 5\%$ (J) optional
Rated Voltage	400 to 1500 Vdc
Operating Temperature Range	-55 °C to 105 °C* *Full rated voltage at 85 °C - derate linearly to 50% rated at 105 °C
Maximum rms Current	Check tables for values
Test Voltage between Terminals @ 25 °C	125% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25 °C	3 kVac @ 50/60 Hz for 60 s
Life Test	2,000 h @ 85 °C, 125% rated voltage
Life Expectancy	60,000 h @ 70 °C, rated voltage
RoHS Compliant	

Dimensions



Construction Details

Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass

Type UNL, DC Link and Filter Capacitors

High Capacitance, High Current, Board Mount

Part Numbering System

UNL	7	W20	K	S	-F
Type	Voltage	Capacitance	Tolerance	Leads	RoHS
UNL	4 = 400 Vdc	W80 = 80μF	K = ±10%	S = Short Pins	Compliant
	5 = 500Vdc	W100 = 100μF	J = ±5%	Blank = Long Pins	
	6 = 600 Vdc	W30 = 30μF			
	7 = 750 Vdc	W50 = 50μF			
	8 = 800 Vdc	W40 = 40μF			
	9 = 900 Vdc	W13P5 = 13.5μF			
	10 = 1000 Vdc	W10 = 10μF			
	12 = 1200 Vdc	W7P5 = 7.5μF			
	15 = 1500 Vdc	W4P7 = 4.7μF			

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

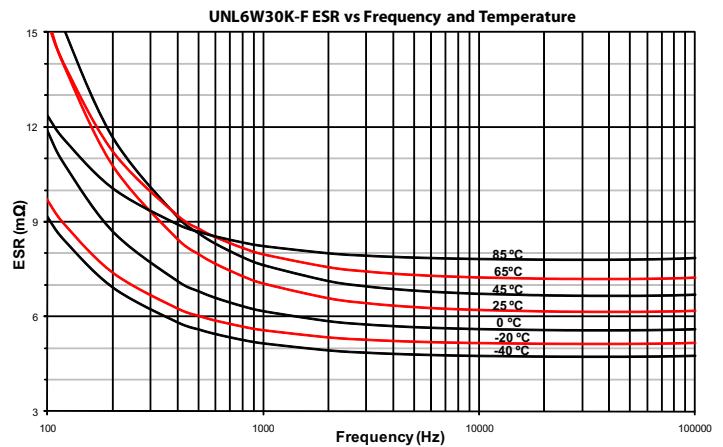
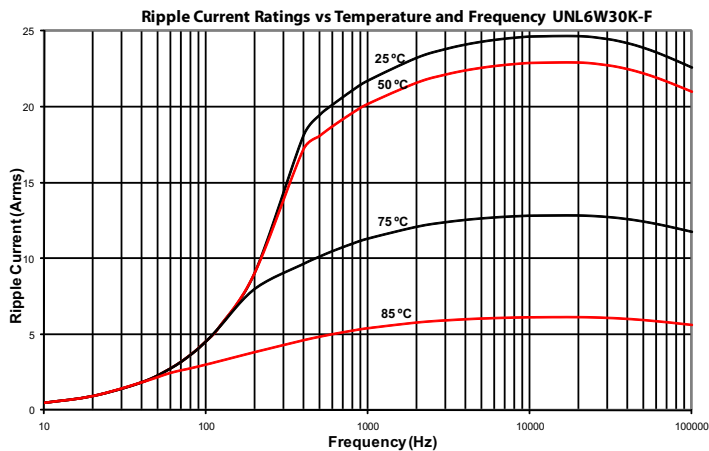
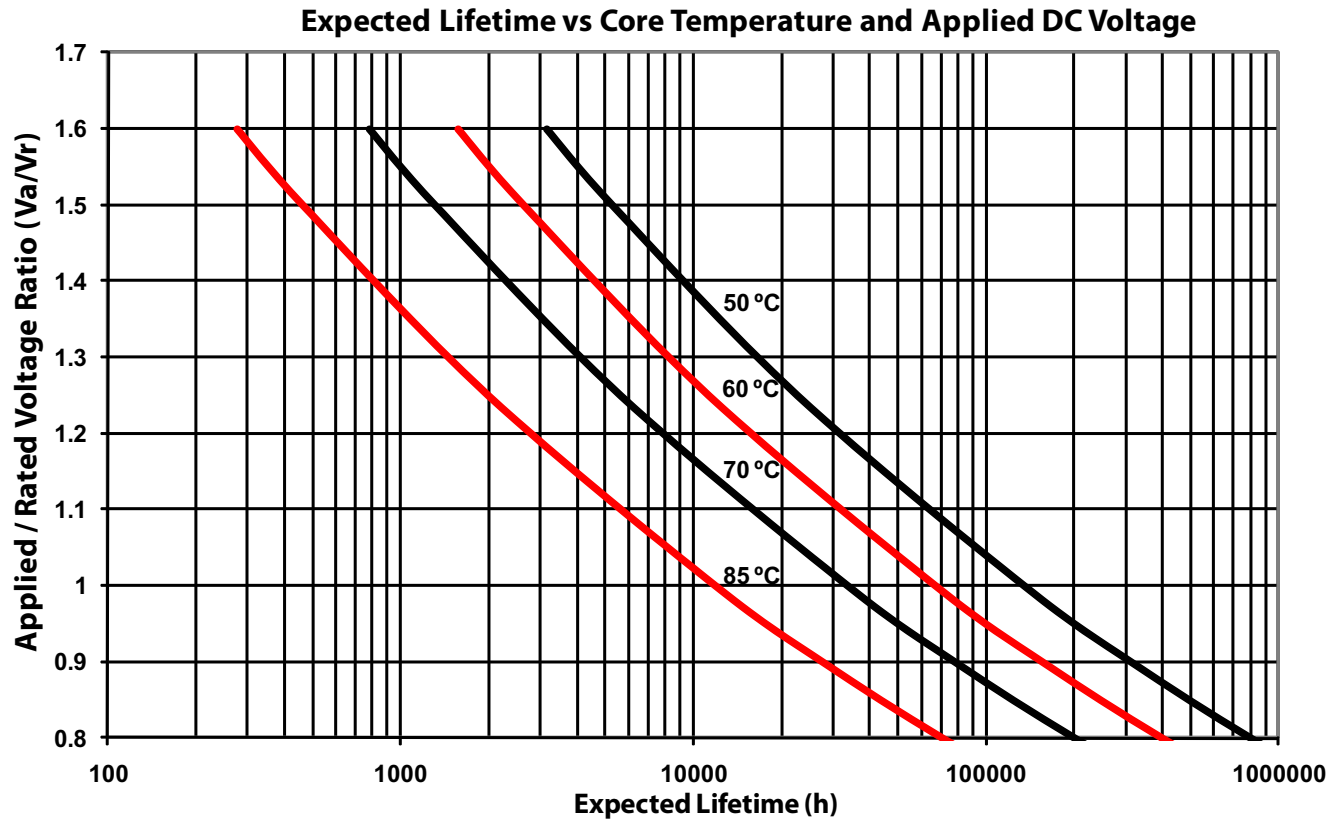
Catalog Part Number*	Cap (μF)	Rated Voltage (Vdc)	Dia. D (mm)	Height H (mm)	Typical ESR @ 100 kHz (mΩ)	dV/dt (V/μs)	Peak Current (A)	Ripple Current @ 100 kHz		
								25 °C (Arms)	50 °C (Arms)	75 °C (Arms)
UNL4W30K-F	30.0	400	35	53.7	6.0	30	900	24.2	19.4	14.6
UNL4W80K-F	80.0	400	50	63	5.0	25	2000	35.0	28.0	14.3
UNL5W35K-F	35.0	500	35	53.7	8.0	26	910	22.0	18.2	13.0
UNL5W100K-F	100.0	500	50	63	6.0	22	2200	31.8	25.4	13.2
UNL6W30K-F	30.0	600	35	53.7	9.0	30	900	20.7	17.0	12.0
UNL6W80K-F	80.0	600	50	63	6.5	25	2000	30.5	24.4	12.6
UNL7W20K-F	20.0	750	35	53.7	10.0	37	740	19.0	16.0	9.9
UNL7W50K-F	50.0	750	50	63	7.0	30	1500	29.4	23.5	12.0
UNL8W15K-F	15.0	800	35	53.7	10.0	42	630	18.8	15.0	9.8
UNL8W40K-F	40.0	800	50	63	7.5	35	1400	28.4	22.8	11.7
UNL9W13P5K-F	13.5	900	35	53.7	10.5	43	580	18.0	14.5	9.6
UNL9W35K-F	35.0	900	50	63	8.0	36	1260	27.5	22.0	11.3
UNL10W10K-F	10.0	1000	35	53.7	12.0	50	500	17.5	13.7	9.0
UNL10W25K-F	25.0	1000	50	63	8.5	40	1000	26.7	21.4	11.0
UNL12W7P5K-F	7.5	1200	35	53.7	13.5	60	450	16.0	12.0	8.4
UNL12W20K-F	20.0	1200	50	63	9.0	50	1000	26.0	20.7	10.7
UNL15W4P7K-F	4.7	1500	35	53.7	15.0	72	338	15.0	11.5	7.8
UNL15W13K-F	13.0	1500	50	63	10.0	60	780	24.6	19.7	10.1

*Add 'S' after 'K' for short pins

Type UNL, DC Link and Filter Capacitors

High Capacitance, High Current, Board Mount

Typical Performance Curves



Type 944U Polypropylene, DC Filter Capacitors

High Current, Low Profile for Inverter Applications



Type 944U is specifically designed for use in high power DC filtering applications. The low inductance internal construction utilizes low loss metallized polypropylene for high ripple current capability. Male or female terminal options offer design flexibility in a rugged UL 94V0 rated flame retardant plastic case and resin fill. High current ratings and robust mounting flanges make the 944U suited for inverter applications in electric vehicle power inverters, wind power inverters and motor drives.

Highlights

- Low Inductance
- Low Profile
- Low ESR
- High Ripple Current
- High Voltage Ratings

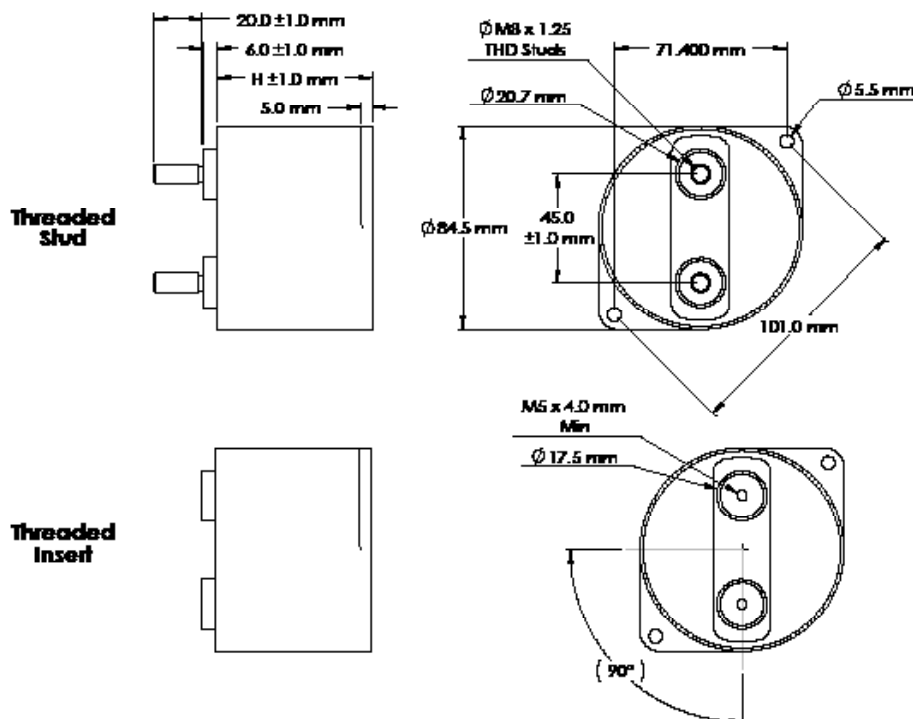
Specifications

Capacitance Range	33 to 220 μ F
Capacitance Tolerance	$\pm 10\%$ standard
Rated Voltage	800 to 1400 Vdc
Operating Temperature Range with Ripple	-40 °C to 85 °C
Maximum rms Current	74A @ 55 °C
Maximum rms Voltage	230 Vac
Test Voltage between Terminal @ 25°C	150% rated DC voltage for 10 s
Test Voltage between Terminals & Case @ 25°C	4 kVac @ 50/60 Hz for 60 s
Life Test	5000 h @ 85 °C, rated voltage
RoHS Compliant	

Dimensions

Construction Details

Case Material	Plastic UL94V-0
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass



Type 944U Polypropylene, DC Filter Capacitors

High Current, Low Profile for Inverter Applications

Part Numbering System

944U	101	K	801	A	A	M
Type	Capacitance	Tolerance	Voltage	Diameter D (mm)	Height H (mm)	Terminal
944U	101 = 100 μ F 700 = 70 μ F 470 = 47 μ F	K = $\pm$ 10%	801 = 800 Vdc 102 = 1000 Vdc 122 = 1200 Vdc 142 = 1400 Vdc	A = 84.5	A = 40 B = 51 C = 64	M = M8 Thd Stud I = M5 Thd Insert

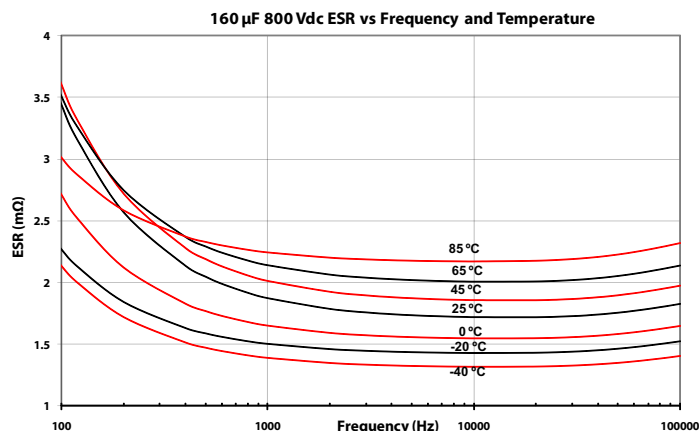
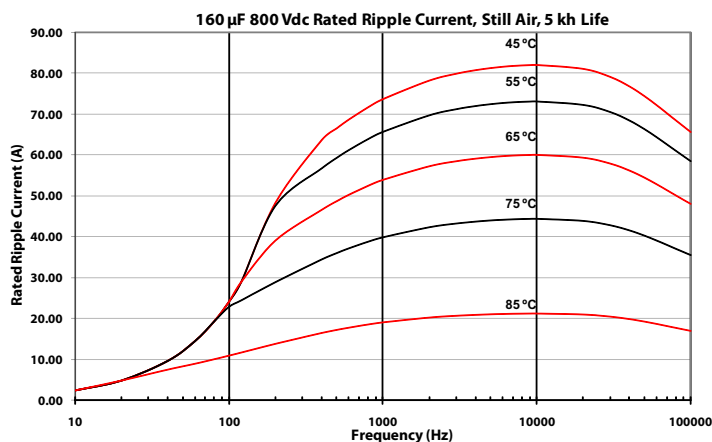
Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Catalog Part Number	Cap (μ F)	Rated Voltage (Vdc)	H Height mm	Max ESR 10kHz (m Ω)	Typical ESL (nH)	Max Irms 55°C (A)	Thermal Resistance Θ_{cc} (°C/W)	Θ_{ca} (°C/W)
944U101K801AA*	100	800	40	0.5	20	74	2.8	5.2
944U161K801AB*	160	800	51	0.8	30	73	3.0	4.5
944U221K801AC*	220	800	64	1.0	40	72	3.1	4.0
944U660K102AA*	66	1000	40	0.6	20	70	2.8	5.2
944U101K102AB*	100	1000	51	0.8	30	68	3.0	4.5
944U141K102AC*	140	1000	64	1.0	40	65	3.1	4.0
944U470K122AA*	47	1200	40	0.7	20	67	2.8	5.2
944U700K122AB*	70	1200	51	1.0	30	65	3.0	4.5
944U101K122AC*	100	1200	64	1.3	40	64	3.1	4.0
944U330K142AA*	33	1400	40	0.8	20	64	2.8	5.2
944U520K142AB*	52	1400	51	1.1	30	60	3.0	4.5
944U700K142AC*	70	1400	64	1.4	40	59	3.1	4.0

* M = M8 Stud I = M5 Insert

Typical Performance Curves



Type 944U Polypropylene, DC Filter Capacitors

High Current, Low Profile for Inverter Applications

Expected Lifetime Predictions

To use the Expected Lifetime curves calculate V_a/V_r and core temperature T . Start by estimating:

Applied dc voltage V_a
Ripple Current I
Ripple Frequency f
Ambient Temperature T_a
Airflow speed v

Units:

$A = m^2$ $T, T_a \text{ \& } T_c = ^\circ C$
 $C = \mu F$ $\theta, \theta_{ca} \text{ \& } \theta_{cc} = ^\circ C/W$
 $ESR = m\Omega$ $v = m/s$
 $f = kHz$ $V_a \text{ \& } V_r = V_{dc}$
 $I = A$

NOTE: The temperature rise in the 944U is $I^2(ESR)$ times the thermal resistance θ . The ESR is mainly the metal resistance; the metal resistance is the 10 kHz ESR. For operation below 10kHz add the dielectric resistance. It is the dielectric dissipation factor—no more than 0.0002—times the capacitive reactance, i.e., $0.0002/(2\pi fC)$. That's equal to $31.83/(fC)$.

1. Start with the 10 kHz ESR from the Ratings table. If frequency is less than 10 kHz, add $31.83/(fC)$.

2. Compute total thermal resistance θ as the sum of core-to-case thermal resistance θ_{cc} and case-to-ambient thermal resistance θ_{ca} . Both are in the Ratings table but θ_{ca} is for still air and θ_{cc} is for 10 kHz or less. For frequency > 10 kHz multiply θ_{cc} by $[1+(f-10)/100]$, e.g., for 75 kHz multiply θ_{cc} by 1.65. For moving air use the capacitor surface area A and airflow speed v to calculate $\theta_{ca} = 1/[A(5+17.5(v+0.1)^{0.66})]$.

3. Compute V_a/V_r and the core temperature T .
 $T = T_a + I^2(ESR)\theta$

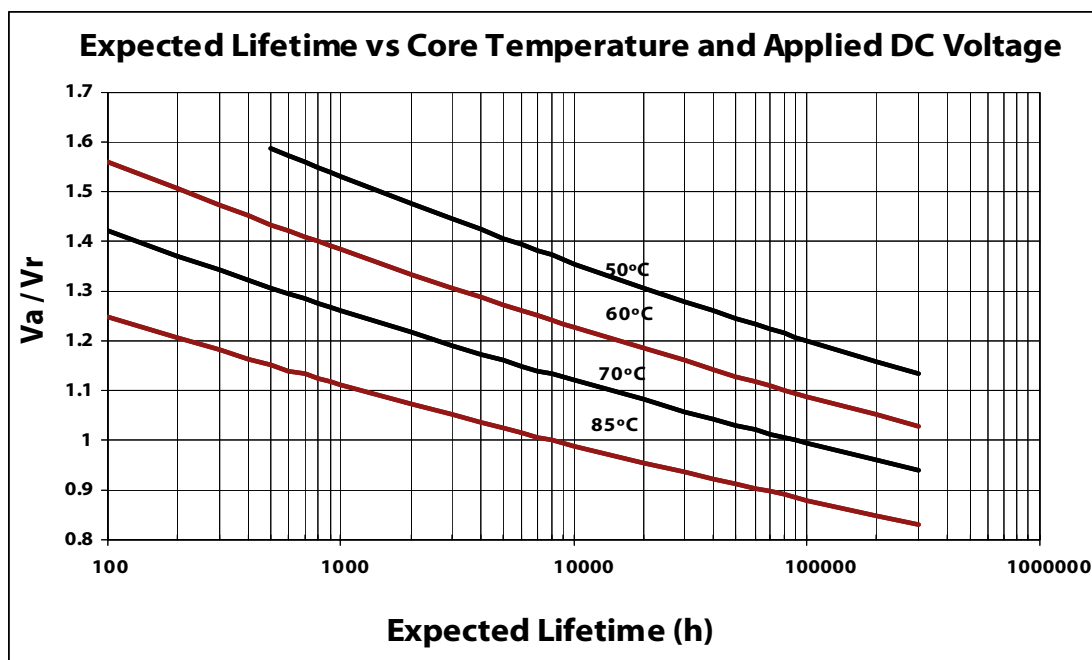
4. Look up estimated lifetime from the Expected Lifetime curves.

5. If you want a longer expected lifetime, choose a capacitor with higher voltage rating or consider using multiple capacitors in parallel to share the ripple current.

The expected lifetime predictions assume no exposure to overvoltage transients. Expected lifetime can be calculated for varying exposure to overvoltage transients. As an illustration at 50 °C the expected lifetime is 100,000 h with the 24-hour V_a/V_r profile below:

V_a / V_r	Duration
1.67	100 ms
1.50	5 minutes
1.30	2.5 hours
1.10	9.6 hours
1.00	11.9 hours

For applications with more severe 24-hour profiles, contact us.



Type 945U Polypropylene, DC Link Capacitors

High Capacitance, Screw Terminal Case for Inverter Applications



Type 945U uses advanced metalized film technology to achieve long-life, high reliability in DC link applications. High voltage and high current ratings packaged in screw-terminal cases allow for replacement of series-parallel banks of aluminum electrolytic capacitors in high ripple current application. Suited for wind and solar power inverters.

Highlights

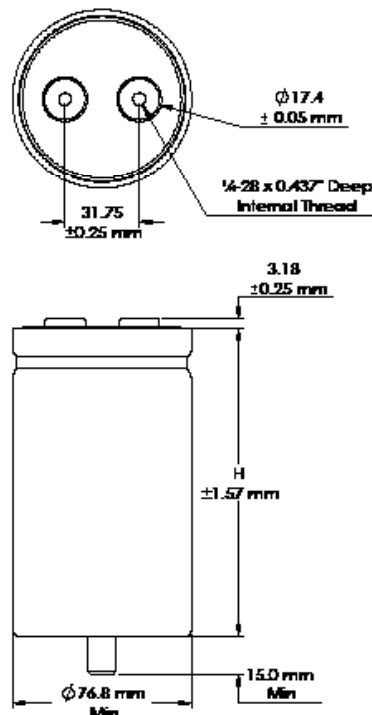
Advantages over Electrolytics

- Exceptionally Low ESR
- High Ripple Current
- Non-Polar
- High Voltage ratings
- Dry Construction - no Electrolyte

Specifications

Capacitance Range	65 to 500 μ F
Capacitance Tolerance	$\pm 10\%$ standard
Rated Voltage	600 to 1000 Vdc
Operating Temperature Range with Ripple	-55 °C to 85 °C
Maximum rms Current	47A @ 50 °C
Maximum rms Voltage	230 Vac
Test Voltage between Terminal @ 25°C	130% rated DC voltage for 60 s
Test Voltage between Terminals & Case @ 25°C	3 kVac @ 50/60 Hz for 60 s
Life Test	2000 h @ 85 °C, 125% rated voltage
RoHS Compliant	

Dimensions



Construction Details

Case Material	Aluminum with Black PVC Sleeve
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass

1/4 - 28 x 0.50" Round Head Screws provided

Shown with optional M12 Mounting Stud
Lock Washer and Hex Nut provided

Type 945U Polypropylene, DC Link Capacitors

High Capacitance, Screw Terminal Case for Inverter Applications

Part Numbering System

945U	171	K	601	D	B	I	S
Type	Capacitance	Tolerance	Voltage	Diameter D mm	Height H mm	Terminal	Mounting
945U	171 = 170 µF 950 = 95 µF 900 = 90 µF	K = ±10%	601 = 600 Vdc 751 = 750 Vdc 901 = 900 Vdc 102 = 1000 Vdc	D = 76.8	B = 80.2 C = 105.2 E = 131.2 M = 156.2	I = ¼ - 28 Insert	blank = No Stud S = M12 Stud

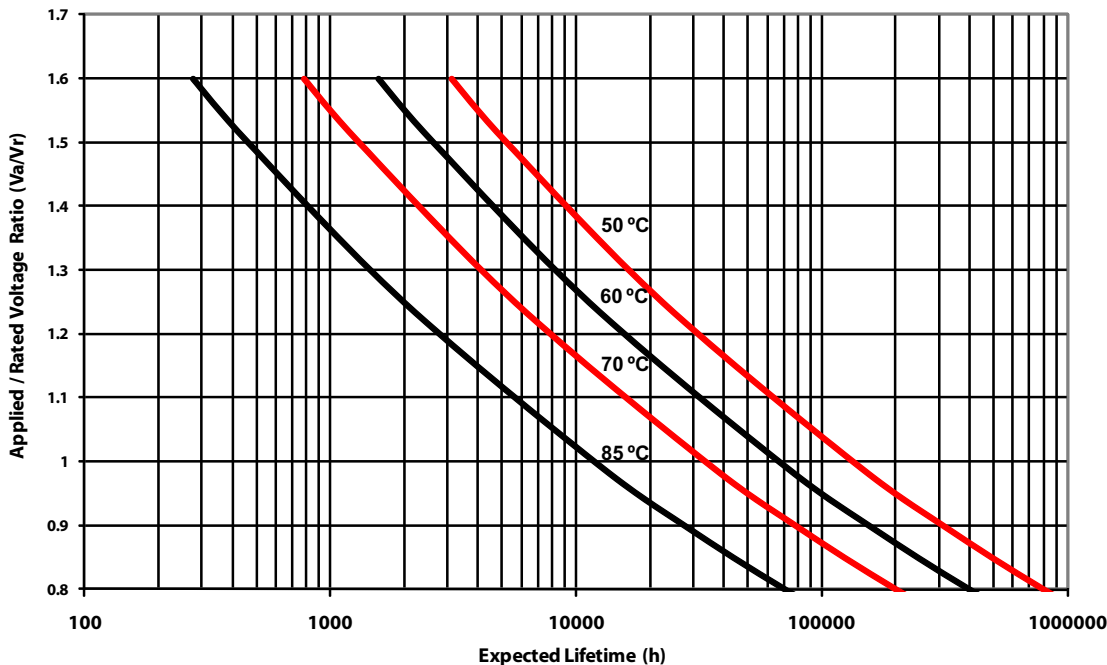
Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Catalog Part Number	Cap (µF)	Rated Voltage (Vdc)	H Height mm	100kHz ESR (mΩ)	dV/dt (V/µs)	Max Irms 10 kHz 50 °C (A)
945U221K601DBI	220	600	80.2	4.0	30	47.0
945U301K601DCI	300	600	105.2	4.5	25	46.0
945U401K601DEI	400	600	131.2	5.0	26	44.0
945U501K601DMI	500	600	156.2	6.0	22	43.0
945U141K751DBI	140	750	80.2	4.5	30	44.0
945U191K751DCI	190	750	105.2	5.0	25	43.0
945U251K751DEI	250	750	131.2	6.0	37	42.0
945U321K751DMI	320	750	156.2	6.5	30	41.0
945U900K901DBI	90	900	80.2	5.0	42	42.0
945U131K901DCI	130	900	105.2	5.5	35	41.0
945U171K901DEI	170	900	131.2	6.5	43	40.0
945U221K901DMI	220	900	156.2	7.5	36	38.0
945U650K102DBI	65	1000	80.2	5.5	50	40.0
945U950K102DCI	95	1000	105.2	6.0	40	39.0
945U131K102DEI	130	1000	131.2	7.0	60	38.0
945U161K102DMI	160	1000	156.2	8.0	50	37.0

Typical Performance Curves

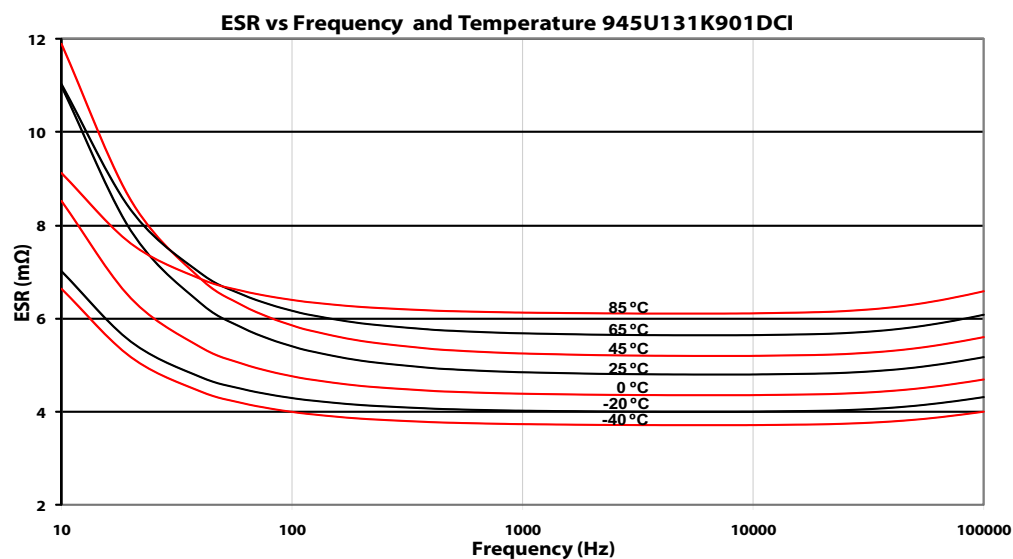
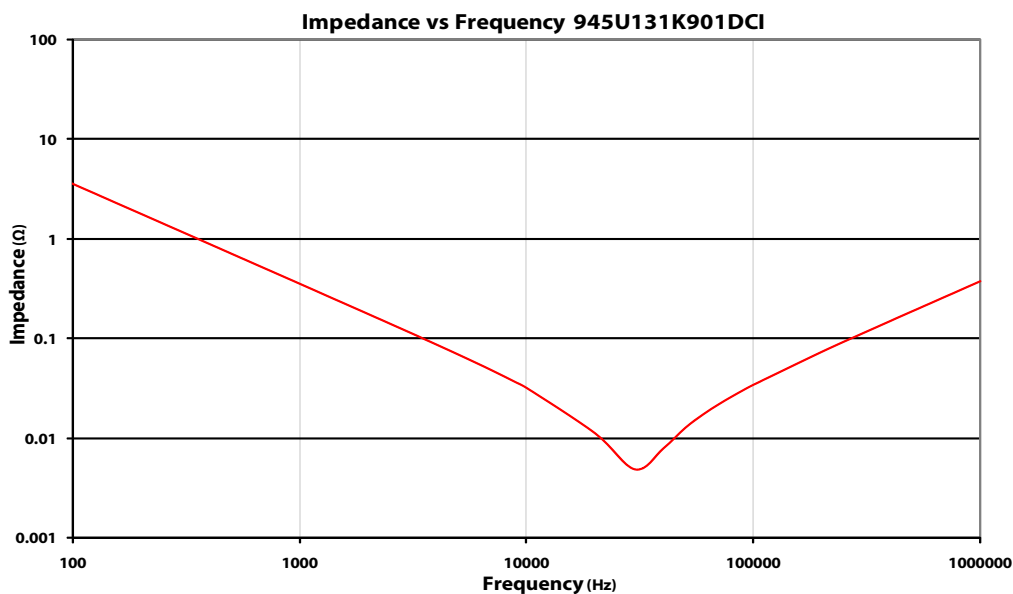
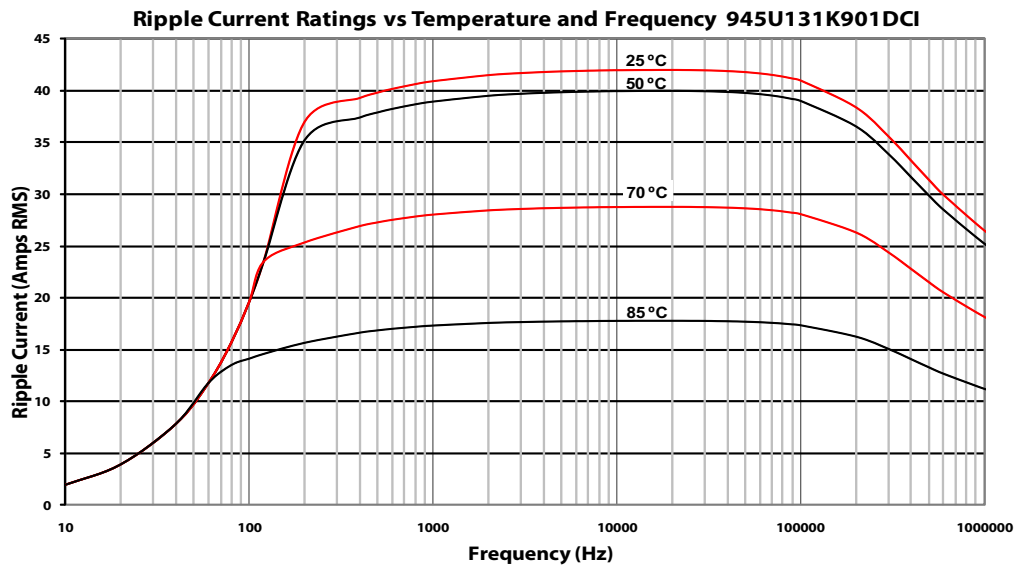
Expected Lifetime vs Core Temperature and Applied DC Voltage



Type 945U Polypropylene, DC Link Capacitors

High Capacitance, Screw Terminal Case for Inverter Applications

Typical Performance Curves



Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications



Type 947C series uses the most advanced metallized film technology for long life, high reliability in DC Link applications. This series delivers high capacitance, high voltage and high ripple current handling capabilities required for inverters used in wind, solar, fuel cell applications and more.

Highlights

- Non-polar dielectric
- Dry, resin filled
- High reliability and life expectancy
- Replacement for aluminum electrolytic capacitors (lower capacitance, higher current)
- High current to 100 Amps
- Low ESR
- Low Inductance

Specifications

Capacitance Range	110 to 1500 μ F
Capacitance Tolerance	$\pm 10\%$ standard, $\pm 5\%$ optional
Rated Voltage	800 to 1300 Vdc
Operating Temperature Range	-40 °C to 85 °C (ambient)
Maximum rms Current	see data tables
Maximum rms Voltage	230 Vac
Test Voltage between Terminals @ 25 °C	150% rated DC voltage for 10 s
Test Voltage between Terminals & Case @ 25 °C	4 kVac @ 50/60 Hz for 60 s
Life Test	5000 h @ 85 °C, rated voltage
Life Expectancy	200,000 h @ 60 °C, rated voltage
Reliability	100 FIT typical (medium size capacitor)
Standards	IEC 61071, IEC 61881
RoHS Compliant	

Dimensions

Construction Details

Case Material	Aluminum with Black PVC Sleeve
Resin Material	Dry Resin UL94V-0
Terminal Material	Tin Plated Brass

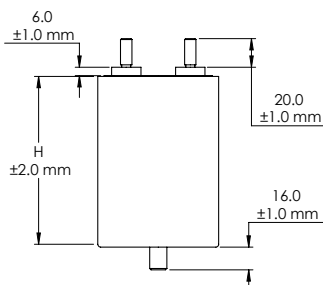
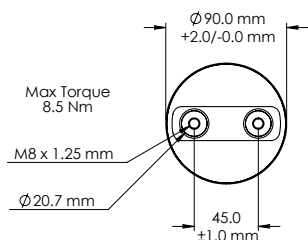


Figure 1

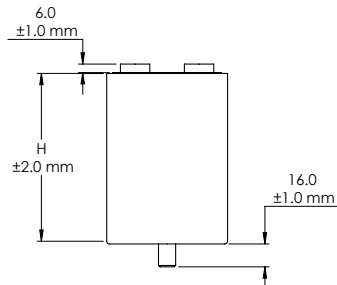
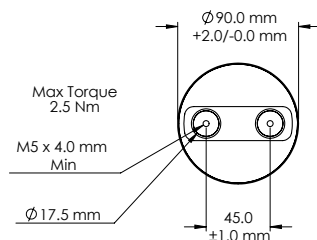


Figure 2

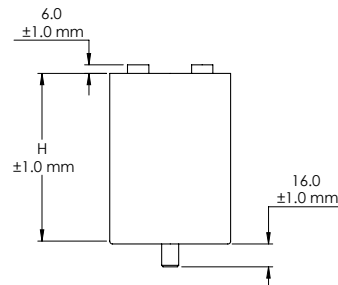
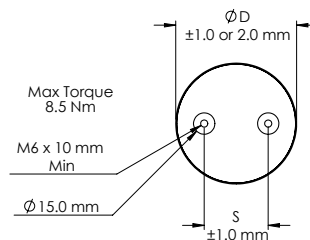


Figure 3

All Shown with Optional M12 x 1.75 THD Stud
Lock Washer and Hex Nut Provided

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Numbering System

947C	361	K	801	C	A	M	S	- NS
Type	Capacitance	Tolerance	Voltage	Diameter D	Height H	Terminal	Mounting	Sleeving
947C	361 = 360 µF	K = ±10 %	801 = 800 Vdc	C = 90 mm	T = 85 mm	I = M5 Insert	blank = no stud	Specify -NS
	731 = 730 µF	J = ±5 %	901 = 900 Vdc	B = 85 mm	A = 97 mm	Threaded	S = M12 Stud	for Bare Can
	152 = 1500 µF		102 = 1000 Vdc	D = 116 mm	B = 120 mm	M = M8 Stud	Threaded	
			112 = 1100 Vdc		G = 140 mm	Threaded		
			122 = 1200 Vdc		C = 145 mm	H = M6 Insert		
			132 = 1300 Vdc		L = 165 mm	Threaded		
					D = 170 mm			

Ratings

NOTE: Other ratings, sizes and performance specifications are available. Contact us.

Part Number	Rated		Can	Can	Lead	Current							
	Cap.	Voltage	Diameter	Height	Spacing	Case	ΔT = 40	Typ	Typ	Thermal Resistance		Mass	Fig
	C (µF)	Vr (Vdc)	D (mm)	H (mm)	S (mm)	Area (mm ²)	Irms (A)	ESR (mΩ)	ESL (nH)	Θcc (°C/W)	Θca (°C/W)	(kg)	
947C311K801BTHS	310	800	85	85	31.7	34000	74	1.2	41	2.9	3.4	0.6	3
947C341K801CTMS	340	800	90	85	45.0	36800	78	1.1	41	2.8	3.1	0.7	1
947C341K801CTIS	340	800	90	85	45.0	36800	78	1.1	41	2.8	3.1	0.7	2
947C361K801CAMS	360	800	90	97	45.0	40100	72	1.3	60	3.0	2.9	0.9	1
947C361K801CAIS	360	800	90	97	45.0	40100	72	1.3	60	3.0	2.9	0.9	2
947C381K801BAHS	380	800	85	97	31.7	37300	71	1.4	44	2.7	3.1	0.7	3
947C411K801CAMS	410	800	90	97	45.0	40100	74	1.3	44	2.7	2.9	0.7	1
947C411K801CAIS	410	800	90	97	45.0	40100	74	1.3	44	2.7	2.9	0.7	2
947C491K801CBMS	490	800	90	120	45.0	46700	70	1.6	75	2.6	2.5	1.0	1
947C491K801CBIS	490	800	90	120	45.0	46700	70	1.6	75	2.6	2.5	1.0	2
947C511K801BBHS	510	800	85	120	31.7	43400	66	1.8	50	2.3	2.6	0.8	3
947C561K801CBMS	560	800	90	120	45.0	46700	70	1.7	50	2.3	2.5	0.9	1
947C561K801CBIS	560	800	90	120	45.0	46700	70	1.7	50	2.3	2.5	0.9	2
947C601K801CCMS	600	800	90	145	45.0	53700	68	2.0	85	2.2	2.1	1.2	1
947C601K801CCIS	600	800	90	145	45.0	53700	68	2.0	85	2.2	2.1	1.2	2
947C621K801DTHS	620	800	116	85	50.0	52100	99	0.7	44	2.1	2.2	1.1	3
947C651K801BGHS	650	800	85	140	31.7	48700	64	2.2	55	2.0	2.4	0.9	3
947C701K801CCMS	700	800	90	145	45.0	53700	68	2.1	56	2.0	2.1	1.1	1
947C701K801CCIS	700	800	90	145	45.0	53700	68	2.1	56	2.0	2.1	1.1	2
947C731K801CDMS	730	800	90	170	45.0	60800	68	2.3	95	1.9	1.9	1.3	1
947C731K801CDIS	730	800	90	170	45.0	60800	68	2.3	95	1.9	1.9	1.3	2
947C751K801DAHS	750	800	116	97	50.0	56500	94	0.8	48	2.1	2	1.2	3
947C791K801BDHS	790	800	85	170	31.7	56700	63	2.7	63	1.7	2	1.1	3
947C851K801CDMS	850	800	90	170	45.0	60800	66	2.5	63	1.7	1.9	1.2	1
947C851K801CDIS	850	800	90	170	45.0	60800	66	2.5	63	1.7	1.9	1.2	2
947C102K801DBHS	1000	800	116	120	50.0	64900	86	1.1	54	2.0	1.8	1.4	3
947C122K801DCHS	1200	800	116	145	50.0	74000	80	1.4	61	1.9	1.6	1.7	3
947C152K801DLHS	1500	800	116	165	50.0	81300	79	1.6	67	1.7	1.4	1.9	3
947C241K901BTHS	240	900	85	85	31.7	34000	70	1.3	41	2.9	3.4	0.6	3

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Number	Rated	Can	Can	Lead	Current								
	Cap.	Voltage	Diameter	Height	Spacing	Case	ΔT = 40	Typ	Typ	Thermal Resistance			
	C	Vr	D	H	S	Area	Irms	ESR	ESL	Θcc	Θca	Mass	Fig
	(μF)	(Vdc)	(mm)	(mm)	(mm)	(mm²)	(A)	(mΩ)	(nH)	(°C/W)	(°C/W)	(kg)	
947C261K901CTMS	260	900	90	85	45.0	36800	73	1.2	41	2.9	3.1	0.7	1
947C261K901CTIS	260	900	90	85	45.0	36800	73	1.2	41	2.9	3.1	0.7	2
947C291K901BAHS	290	900	85	97	31.7	37300	66	1.6	44	2.7	3.1	0.7	3
947C321K901CAMS	320	900	90	97	45.0	40100	71	1.4	44	2.7	2.9	0.7	1
947C321K901CAIS	320	900	90	97	45.0	40100	71	1.4	44	2.7	2.9	0.7	2
947C401K901BBHS	400	900	85	120	31.7	43400	63	2.0	50	2.3	2.6	0.8	3
947C431K901CBMS	430	900	90	120	45.0	46700	66	1.9	50	2.3	2.5	0.9	1
947C431K901CBIS	430	900	90	120	45.0	46700	66	1.9	50	2.3	2.5	0.9	2
947C481K901DTHS	480	900	116	85	50.0	52100	94	0.8	44	2.1	2.2	1.1	3
947C511K901BGHS	510	900	85	140	31.7	48700	61	2.5	55	2.0	2.4	0.9	3
947C551K901CCMS	550	900	90	145	45.0	53700	64	2.3	56	2.0	2.1	1.0	1
947C551K901CCIS	550	900	90	145	45.0	53700	64	2.3	56	2.0	2.1	1.0	2
947C581K901DAHS	580	900	116	97	50.0	56500	89	0.9	48	2.1	2	1.2	3
947C611K901BDHS	610	900	85	170	31.7	56700	60	3.0	63	1.7	2	1.1	3
947C661K901CDMS	660	900	90	170	45.0	60800	63	2.8	63	1.8	1.9	1.2	1
947C661K901CDIS	660	900	90	170	45.0	60800	63	2.8	63	1.8	1.9	1.2	2
947C791K901DBHS	790	900	116	120	50.0	64900	83	1.2	54	2.0	1.8	1.4	3
947C102K901DCHS	1000	900	116	145	50.0	74000	79	1.4	61	1.8	1.6	1.7	3
947C122K901DLHS	1200	900	116	165	50.0	81300	77	1.7	67	1.6	1.4	1.9	3
947C191K102BTHS	190	1000	85	85	31.7	34000	66	1.5	41	2.9	3.4	0.6	3
947C211K102CTMS	210	1000	90	85	45.0	36800	71	1.3	41	2.9	3.1	0.7	1
947C211K102CTIS	210	1000	90	85	45.0	36800	71	1.3	41	2.9	3.1	0.7	2
947C231K102CAMS	230	1000	90	97	45.0	40100	67	1.5	60	3.0	2.9	0.9	1
947C231K102CAIS	230	1000	90	97	45.0	40100	67	1.5	60	3.0	2.9	0.9	2
947C241K102BAHS	240	1000	85	97	31.7	37300	65	1.7	44	2.7	3.1	0.7	3
947C251K102CAMS	250	1000	90	97	45.0	40100	66	1.6	44	2.7	2.9	0.8	1
947C251K102CAIS	250	1000	90	97	45.0	40100	66	1.6	44	2.7	2.9	0.8	2
947C311K102CBMS	310	1000	90	120	45.0	46700	63	2.0	75	2.6	2.5	1.0	1
947C311K102CBIS	310	1000	90	120	45.0	46700	63	2.0	75	2.6	2.5	1.0	2
947C321K102BBHS	320	1000	85	120	31.7	43400	60	2.2	50	2.3	2.6	0.8	3
947C351K102CBMS	350	1000	90	120	45.0	46700	64	2.1	50	2.3	2.5	0.9	1
947C351K102CBIS	350	1000	90	120	45.0	46700	64	2.1	50	2.3	2.5	0.9	2
947C381K102DTHS	380	1000	116	85	50.0	52100	90	0.8	44	2.2	2.2	1.1	3
947C391K102CCMS	390	1000	90	145	45.0	53700	62	2.4	85	2.2	2.1	1.2	1
947C391K102CCIS	390	1000	90	145	45.0	53700	62	2.4	85	2.2	2.1	1.2	2
947C411K102BGHS	410	1000	85	140	31.7	48700	58	2.7	55	2.0	2.4	0.9	3
947C441K102CCMS	440	1000	90	145	45.0	53700	61	2.6	56	2.0	2.1	1.1	1
947C441K102CCIS	440	1000	90	145	45.0	53700	61	2.6	56	2.0	2.1	1.1	2
947C471K102DAHS	470	1000	116	97	50.0	56500	86	1.0	48	2.1	2	1.2	3
947C471K102CDMS	470	1000	90	170	45.0	60800	60	2.9	95	1.9	1.9	1.3	1
947C471K102CDIS	470	1000	90	170	45.0	60800	60	2.9	95	1.9	1.9	1.3	2
947C491K102BDHS	490	1000	85	170	31.7	56700	57	3.3	63	1.7	2	1.1	3

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Number	Rated	Can	Can	Lead	Current								
	Cap.	Voltage	Diameter	Height	Spacing	Case	ΔT = 40	Typ	Typ	Thermal Resistance			
	C	Vr	D	H	S	Area	Irms	ESR	ESL	Θcc	Θca	Mass	
	(μF)	(Vdc)	(mm)	(mm)	(mm)	(mm²)	(A)	(mΩ)	(nH)	(°C/W)	(°C/W)	(kg)	Fig
947C531K102CDMS	530	1000	90	170	45.0	60800	60	3.1	63	1.8	1.9	1.2	1
947C531K102CDIS	530	1000	90	170	45.0	60800	60	3.1	63	1.8	1.9	1.2	2
947C641K102DBHS	640	1000	116	120	50.0	64900	80	1.3	54	2.0	1.8	1.4	3
947C801K102DCHS	800	1000	116	145	50.0	74000	76	1.5	61	1.8	1.6	1.7	3
947C971K102DLHS	970	1000	116	165	50.0	81300	74	1.8	67	1.6	1.4	1.9	3
947C161K112BTHS	160	1100	85	85	31.7	34000	64	1.5	41	2.9	3.4	0.6	3
947C171K112CTMS	170	1100	90	85	45.0	36800	67	1.5	41	2.9	3.1	0.7	1
947C171K112CTIS	170	1100	90	85	45.0	36800	67	1.5	41	2.9	3.1	0.7	2
947C191K112BAHS	190	1100	85	97	31.7	37300	61	1.9	44	2.7	3.1	0.7	3
947C211K112CAMS	210	1100	90	97	45.0	40100	65	1.7	44	2.7	2.9	0.8	1
947C211K112CAIS	210	1100	90	97	45.0	40100	65	1.7	44	2.7	2.9	0.8	2
947C261K112BBHS	260	1100	85	120	31.7	43400	57	2.5	50	2.3	2.6	0.8	3
947C281K112CBMS	280	1100	90	120	45.0	46700	60	2.3	50	2.3	2.5	0.9	1
947C281K112CBIS	280	1100	90	120	45.0	46700	60	2.3	50	2.3	2.5	0.9	2
947C311K112DTHS	310	1100	116	85	50.0	52100	86	0.9	44	2.2	2.2	1.1	3
947C331K112BCHS	330	1100	85	145	31.7	50100	55	3.0	56	2.0	2.3	0.9	3
947C361K112CCMS	360	1100	90	145	45.0	53700	59	2.8	56	2.0	2.1	1.1	1
947C361K112CCIS	360	1100	90	145	45.0	53700	59	2.8	56	2.0	2.1	1.1	2
947C381K112DAHS	380	1100	116	97	50.0	56500	82	1.1	48	2.2	2	1.2	3
947C401K112BDHS	400	1100	85	170	31.7	56700	54	3.6	63	1.7	2	1.1	3
947C431K112CDMS	430	1100	90	170	45.0	60800	57	3.4	63	1.8	1.9	1.2	1
947C431K112CDIS	430	1100	90	170	45.0	60800	57	3.4	63	1.8	1.9	1.2	2
947C521K112DBHS	520	1100	116	120	50.0	64900	76	1.4	54	2.0	1.8	1.4	3
947C661K112DCHS	660	1100	116	145	50.0	74000	73	1.7	61	1.8	1.6	1.7	3
947C801K112DLHS	800	1100	116	165	50.0	81300	71	2.0	67	1.6	1.4	1.9	3
947C131K122BTHS	130	1200	85	85	31.7	34000	61	1.7	41	2.9	3.4	0.6	3
947C141K122CTIS	140	1200	90	85	45.0	36800	64	1.6	41	2.9	3.1	0.7	1
947C141K122CTIS	140	1200	90	85	45.0	36800	64	1.6	41	2.9	3.1	0.7	2
947C161K122BAHS	160	1200	85	97	31.7	37300	59	2.0	44	2.7	3.1	0.7	3
947C161K122CAMS	160	1200	90	97	45.0	40100	62	1.8	60	3.0	2.9	0.9	1
947C161K122CAIS	160	1200	90	97	45.0	40100	62	1.8	60	3.0	2.9	0.9	2
947C171K122CAMS	170	1200	90	97	45.0	40100	61	1.9	44	2.8	2.9	0.8	1
947C171K122CAIS	170	1200	90	97	45.0	40100	61	1.9	44	2.8	2.9	0.8	2
947C211K122CBMS	210	1200	90	120	45.0	46700	57	2.4	75	2.6	2.5	1.0	1
947C211K122CBIS	210	1200	90	120	45.0	46700	57	2.4	75	2.6	2.5	1.0	2
947C221K122BBHS	220	1200	85	120	31.7	43400	55	2.6	50	2.3	2.6	0.8	3
947C241K122CBMS	240	1200	90	120	45.0	46700	59	2.4	50	2.3	2.5	0.9	1
947C241K122CBIS	240	1200	90	120	45.0	46700	59	2.4	50	2.3	2.5	0.9	2
947C261K122DTHS	260	1200	116	85	50.0	52100	84	1.0	44	2.2	2.2	1.1	3
947C271K122CCMS	270	1200	90	145	45.0	53700	56	2.9	85	2.2	2.1	1.2	1
947C271K122CCIS	270	1200	90	145	45.0	53700	56	2.9	85	2.2	2.1	1.2	2
947C281K122BGHS	280	1200	85	140	31.7	48700	53	3.3	55	2.0	2.4	0.9	3

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Part Number	Rated	Can	Can	Lead	Current								
	Cap.	Voltage	Diameter	Height	Spacing	Case	ΔT = 40	Typ	Typ	Thermal Resistance			
	C	Vr	D	H	S	Area	Irms	ESR	ESL	Θcc	Θca	Mass	Fig
(μF)	(Vdc)	(mm)	(mm)	(mm)	(mm²)	(A)	(mΩ)	(nH)	(°C/W)	(°C/W)	(kg)		
947C301K122CCMS	300	1200	90	145	45.0	53700	56	3.1	56	2.0	2.1	1.1	1
947C301K122CCIS	300	1200	90	145	45.0	53700	56	3.1	56	2.0	2.1	1.1	2
947C321K122DAHS	320	1200	116	97	50.0	56500	80	1.1	48	2.1	2	1.2	3
947C321K122CDMS	320	1200	90	170	45.0	60800	56	3.4	95	1.9	1.9	1.3	1
947C321K122CDIS	320	1200	90	170	45.0	60800	56	3.4	95	1.9	1.9	1.3	2
947C331K122BDHS	330	1200	85	170	31.7	56700	52	4.0	63	1.7	2	1.1	3
947C361K122CDMS	360	1200	90	170	45.0	60800	55	3.7	63	1.8	1.9	1.2	1
947C361K122CDIS	360	1200	90	170	45.0	60800	55	3.7	63	1.8	1.9	1.2	2
947C431K122DBHS	430	1200	116	120	50.0	64900	73	1.5	54	2.0	1.8	1.4	3
947C551K122DCHS	550	1200	116	145	50.0	74000	70	1.8	61	1.8	1.6	1.7	3
947C661K122DLHS	660	1200	116	165	50.0	81300	68	2.2	67	1.6	1.4	1.9	3
947C111K132BTHS	110	1300	85	85	31.7	34000	59	1.8	41	2.9	3.4	0.6	3
947C121K132CTMS	120	1300	90	85	45.0	36800	62	1.7	41	2.9	3.1	0.7	1
947C121K132CTIS	120	1300	90	85	45.0	36800	62	1.7	41	2.9	3.1	0.7	2
947C131K132BAHS	130	1300	85	97	31.7	37300	55	2.3	44	2.8	3.1	0.7	3
947C151K132CAMS	150	1300	90	97	45.0	40100	60	2.0	44	2.7	2.9	0.7	1
947C151K132CAIS	150	1300	90	97	45.0	40100	60	2.0	44	2.7	2.9	0.7	2
947C181K132BBHS	180	1300	85	120	31.7	43400	52	2.9	50	2.3	2.6	0.8	3
947C201K132CBMS	200	1300	90	120	45.0	46700	56	2.7	50	2.3	2.5	0.9	1
947C201K132CBIS	200	1300	90	120	45.0	46700	56	2.7	50	2.3	2.5	0.9	2
947C221K132DTHS	220	1300	116	85	50.0	52100	81	1.0	44	2.2	2.2	1.1	3
947C231K132BGHS	230	1300	85	140	31.7	48700	50	3.6	55	2.0	2.4	0.9	3
947C251K132CCMS	250	1300	90	145	45.0	53700	54	3.3	56	2.0	2.1	1.1	1
947C251K132CCIS	250	1300	90	145	45.0	53700	54	3.3	56	2.0	2.1	1.1	2
947C271K132DAHS	270	1300	116	97	50.0	56500	77	1.2	48	2.1	2	1.2	3
947C281K132BDHS	280	1300	85	170	31.7	56700	50	4.3	63	1.7	2	1.1	3
947C311K132CDMS	310	1300	90	170	45.0	60800	53	3.9	63	1.7	1.9	1.2	1
947C311K132CDIS	310	1300	90	170	45.0	60800	53	3.9	63	1.7	1.9	1.2	2
947C371K132DBHS	370	1300	116	120	50.0	64900	71	1.6	54	2.0	1.8	1.4	3
947C461K132DCHS	460	1300	116	145	50.0	74000	67	2.0	61	1.8	1.6	1.7	3
947C561K132DLHS	560	1300	116	165	50.0	81300	65	2.3	67	1.6	1.4	1.9	3

1. Rated Current is for temperature rise of +40 °C at 1–20 kHz.
2. Θcc is core-to-case thermal resistance at 0–10 kHz. For higher frequency see [Expected Lifetime Predictions](#).
3. Θca is case-to-ambient thermal resistance for still air. For moving air see [Expected Lifetime Predictions](#).

Type 947C Polypropylene, DC Link Capacitors

High Current, High Capacitance for Inverter Applications

Expected Lifetime Predictions

To use the Expected Lifetime curves calculate V_a/V_r and core temperature T . Start by estimating:

Applied dc voltage V_a
Ripple Current I
Ripple Frequency f
Ambient Temperature T_a
Airflow speed v

Units:

$A = m^2$ $T, T_a \text{ \& } T_c = ^\circ C$
 $C = \mu F$ $\theta, \theta_{ca} \text{ \& } \theta_{cc} = ^\circ C/W$
 $ESR = m\Omega$ $v = m/s$
 $f = kHz$ $V_a \text{ \& } V_r = V_{dc}$
 $I = A$

NOTE: The temperature rise in the 947C is $I^2(ESR)$ times the thermal resistance θ . The ESR is mainly the metal resistance; the metal resistance is the 10 kHz ESR. For operation below 10 kHz add the dielectric resistance. It is the dielectric dissipation factor—no more than 0.0002—times the capacitive reactance, i.e., $0.0002/(2\pi fC)$. That's equal to $31.83/(fC)$.

1. Start with the 10 kHz ESR from the Ratings table. If frequency is less than 10 kHz, add $31.83/(fC)$.

2. Compute total thermal resistance θ as the sum of core-to-case thermal resistance θ_{cc} and case-to-ambient thermal resistance θ_{ca} . Both are in the Ratings table but θ_{ca} is for still air and θ_{cc} is for 10 kHz or less. For frequency > 10 kHz multiply θ_{cc} by $[1+(f-10)/100]$, e.g., for 75 kHz multiply θ_{cc} by 1.65. For moving air use the capacitor surface area A and airflow speed v to calculate $\theta_{ca} = 1/[A(5+17(v+0.1)^{0.66})]$.

3. Compute V_a/V_r and the core temperature T .
 $T = T_a + I^2(ESR)\theta$

4. Look up estimated lifetime from the Expected Lifetime curves.

5. If you want a longer expected lifetime, choose a capacitor with higher voltage rating or consider using multiple capacitors in parallel to share the ripple current.

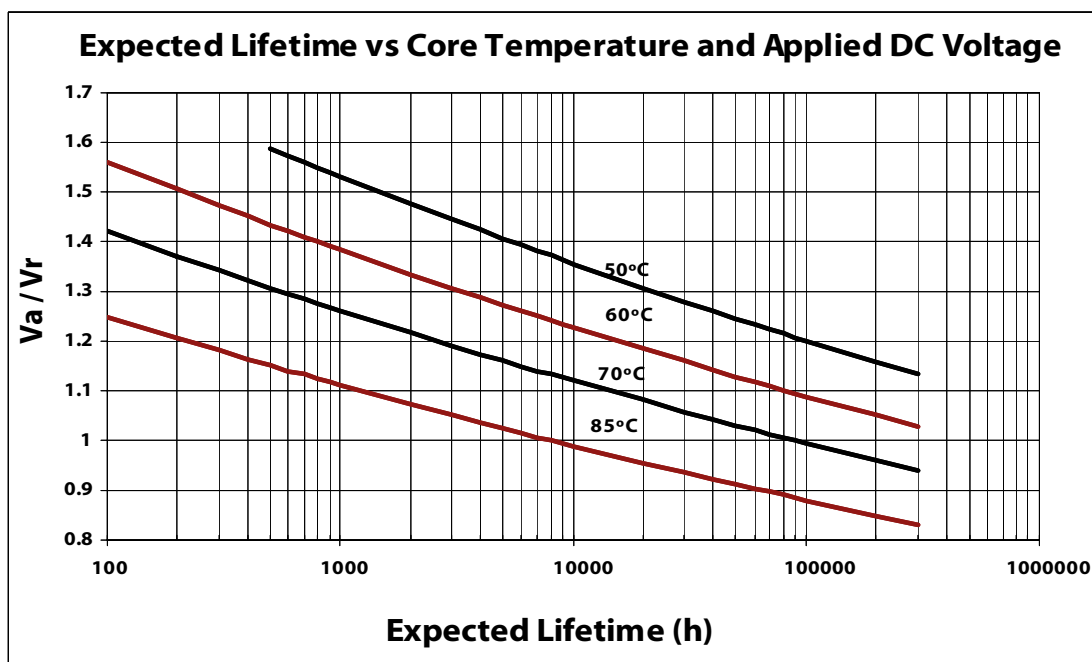
The expected lifetime predictions assume no exposure to overvoltage transients.

Expected lifetime can be calculated for varying exposure to overvoltage transients.

As an illustration at 50 °C the expected lifetime is 100,000 h with the 24-hour V_a/V_r profile below:

V_a/V_r	Duration
1.67	100 ms
1.50	5 minutes
1.30	2.5 hours
1.10	9.6 hours
1.00	11.9 hours

For applications with more severe 24-hour profiles, contact us.



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Typical Performance Curves

