Type 947C High Capacitance, High Current, DC Link Capacitors

Metallized Polypropylene Dielectric

Type 947C series uses the most advanced metallized film technology for long life, high reliability in DC link applications. Their high-voltage and high-current ratings allow for replacement of series-parallel banks of aluminum electrolytic capacitors in high ripple current applications.

Applications

Inverters: >5kW
Renewable Energy Inverters: Wind, Solar, Fuel Cell
Aircraft Inverters: Power Supplies and Motor Drives
Transportation: Electric Vehicles, Traction
Industrial: Welders, Motor Drives, Elevators, and Overhead Cranes

Specifications

Capacitance Range:	160 µF to 730 µF
Tolerance:	±10%
Rated Voltage:	800 Vdc, 1000 Vdc, 1200 Vdc
Operating Temperature Range With Ripple:	–40 ºC to +85 ºC
Maximum rms Current:	60 A @ +55 ºC
Maximum rms Voltage:	<230 Vac
Test Voltage Between Terminals @ 25 ºC:	150% rated DC voltage for 10 s
Test Voltage Between Terminals and Case @ 25 ºC:	4 kVac @ 50/60 Hz for 1 min
Life Test:	5000 h @ +85 ºC, rated voltage

RoHS Compliant

Complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

Ratings

Catalog Part Number	Cap (µF)	Rated Voltage (Vdc)	D Dia. (mm)	H Height (mm)	A Case Area (mm²)	Rated Current ΔT = 40 ºC (A)	Typical ESR @ 10 kHz (mΩ)	Series Inductance (nH)	Thermal Resistance θcc (ºC/W)	Thermal Resistance θca (ºC/W)	Mass (kg)
947C361K801CAMS	360	800	92	97	40100	72	1.3	60	3.0	2.9	0.9
947C491K801CBMS	490	800	92	120	46700	70	1.6	75	2.6	2.5	1.0
947C601K801CCMS	600	800	92	145	53700	68	2.0	85	2.2	2.1	1.2
947C731K801CDMS	730	800	92	170	60800	68	2.3	95	1.9	1.9	1.3
947C231K102CAMS	230	1000	92	97	40100	67	1.5	60	3.0	2.9	0.9
947C311K102CBMS	310	1000	92	120	46700	63	2.0	75	2.6	2.5	1.0
947C391K102CCMS	390	1000	92	145	53700	62	2.4	85	2.2	2.1	1.2
947C471K102CDMS	470	1000	92	170	60800	60	2.9	95	1.9	1.9	1.3
947C161K122CAMS	160	1200	92	97	40100	62	1.8	60	3.0	2.9	0.9
947C211K122CBMS	210	1200	92	120	46700	57	2.4	75	2.6	2.5	1.0
947C271K122CCMS	270	1200	92	145	53700	56	2.9	85	2.2	2.1	1.2
947C321K122CDMS	320	1200	92	170	60800	56	3.4	95	1.9	1.9	1.3

1. Rated Current is for temperature rise of +40 ºC 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**.

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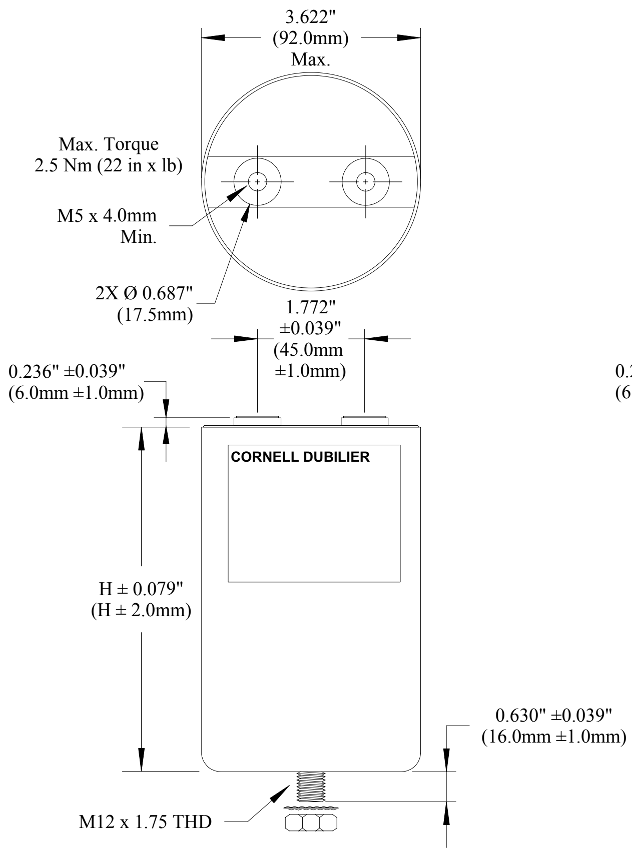
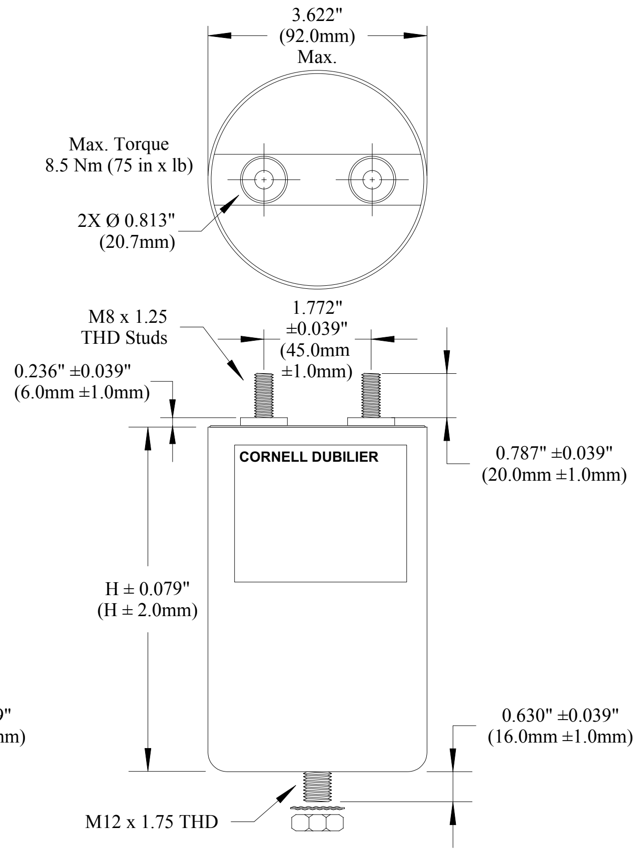
Outline Drawings

M5 Threaded Insert Terminals



Optional Mounting Stud

M8 Threaded Stud Terminals



Optional Mounting Stud

Part Numbering System

947C	361	K	801	C	A	M	S
Type	Capacitance	Tolerance	Voltage	Diameter D	Height H	Terminal	Mounting
947C	**361** = 360 µF	**K** = ±10 %	**801** = 800 Vdc	**C =** 92 mm	**A** = 97 mm	**I** = M5 Insert Threaded	**blank** = no stud
	731 = 730 µF		**102** = 1000 Vdc		**B** = 120 mm	**M** = M8 Stud Threaded	**S** = M12 Stud Threaded
			122 = 1200 Vdc		**C** = 145 mm		
					D = 170 mm		

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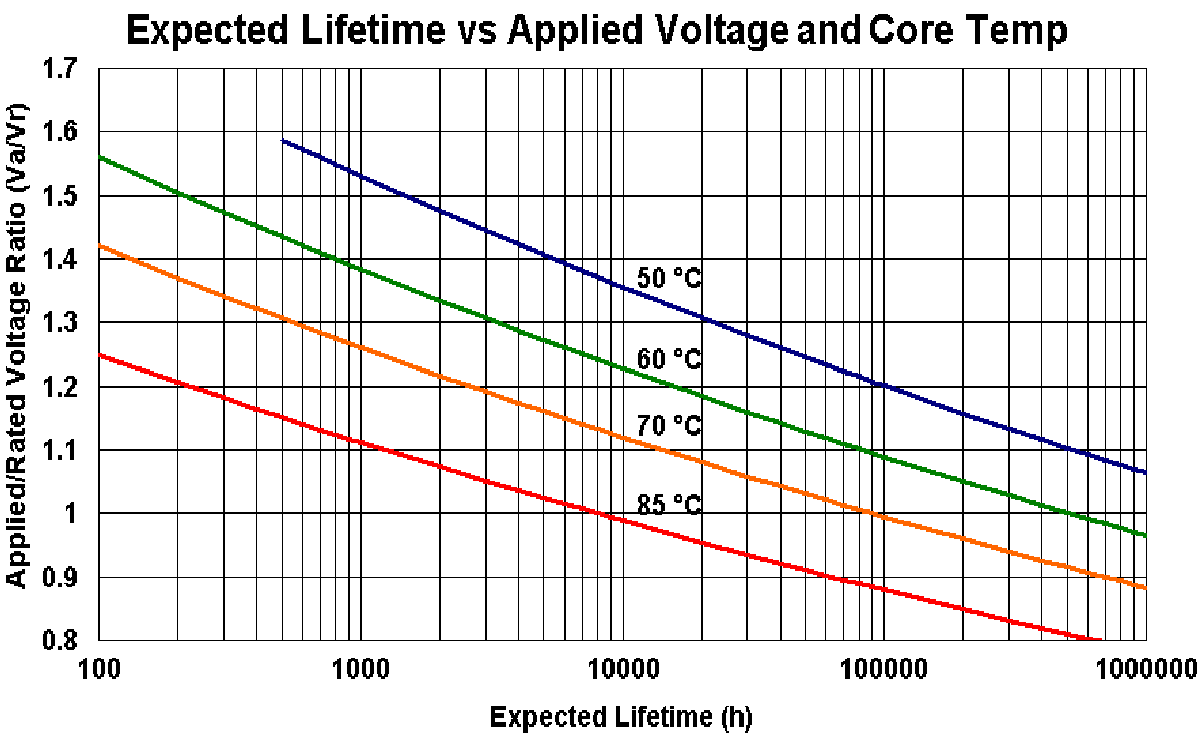

Expected Lifetime Predictions

To use the Expected Lifetime curves calculate Va ⁄ Vr and core temperature T. Start by estimating:

Applied dc voltage Va
Ripple Current I
Ripple Frequency f
Ambient Temperature Ta
Airflow speed v

Units:

A=m²	T, Ta & Tc=°C
C=μF	θ, θca & θcc =°C/W
ESR=mΩ	v=m/s
f=kHz	Va &Vr=Vdc
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 ⁄ (2πfC). 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 θcc and case-to-ambient thermal resistance θca. Both are in the Ratings table but θca is for still air and θcc is for 10 kHz or less. For frequency > 10 kHz multiply θcc by [1+(f –10)/100], e.g., for 75 kHz multiply θcc 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 Va ⁄ Vr and the core temperature T.
   $T = Ta + I^2(ESR)\theta$

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.

Permissible Voltage Surge Duty for 100,000 Hour
Life Expectancy at 50 ºC Core Temperature

Factor	Duration	Frequency
1.67x	t≤ 100 ms	1x/day
1.50x	t≤ 5 minutes	1x/day
1.30x	t≤ 2.5 hours	1x/day
1.10x	t≤ 9.6 hours	1x/day
1.00x	balance (11.9 h)	1x/day

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Typical Performance Curves