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:	230 µF to 730 µF
Tolerance:	±10%
Rated Voltage:	800 Vdc, 1000 Vdc, 1200 Vdc
Maximum rms Current (Irms Max):	60 Arms
Test Voltage Between Terminals @ 25 °C:	150% rated DC voltage 10s
Test Voltage Between Terminals and Case @ 25 °C:	4 kVrms @ 50 Hz for 1 min.
Life Test Rating:	60,000 hrs @ 40 °C, rated voltage

Ratings

Catalog Part Number	Cap (µF)	Rated Voltage (Vdc)	Height (mm)	Irms (A)	Typical Rs(mW)2 (mΩ)[2]	Ls (nH)	θcc (°C/W)[3]	θca (°C/W)[4]	Mass (kg)
947C361K801	360	800	97	72	1.3	60	3.0	2.9	0.9
947C491K801	490	800	120	70	1.6	75	2.6	2.5	1.0
947C601K801	600	800	145	68	2.0	85	2.2	2.1	1.2
947C731K801	730	800	170	68	2.3	95	1.9	1.9	1.3
947C231K102	230	1000	97	67	1.5	60	3.0	2.9	0.9
947C311K102	310	1000	120	63	2.0	75	2.6	2.5	1.0
947C391K102	390	1000	145	62	2.4	85	2.2	2.1	1.2
947C471K102	470	1000	170	60	2.9	95	1.9	1.9	1.3
947C161K122	160	1200	97	62	1.8	60	3.0	2.9	0.9
947C211K122	210	1200	120	57	2.4	75	2.6	2.5	1.0
947C271K122	270	1200	145	56	2.9	85	2.2	2.1	1.2
947C321K122	320	1200	170	56	3.4	95	1.9	1.9	1.3

ΔT_{MAX} = 40 °C

Notes:
1. Rated Current is at 1 to 20 kHz at 40 °C core temperature rise above ambient.
2. ESR is specified at 10 kHz.
3. θcc (core-to-case thermal resistance) value is at 0 to 10 kHz. For higher frequencies, use the multipliers in the table entitled (θcc Frequency Multipliers" or use the formula θcc Frequency Multiplier = 1+f/(100 kHz).
4. θca (case-to-ambient thermal resistance) value is given in natural convection (0 m/s). For other air velocities v (m/s), use the total capacitor surface area A in square meters and the formula $\theta ca = 1/[A(5+17(v+0.1)^{0.66}]$

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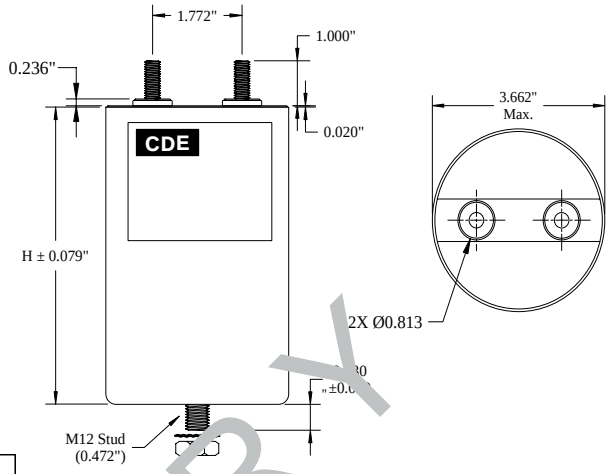
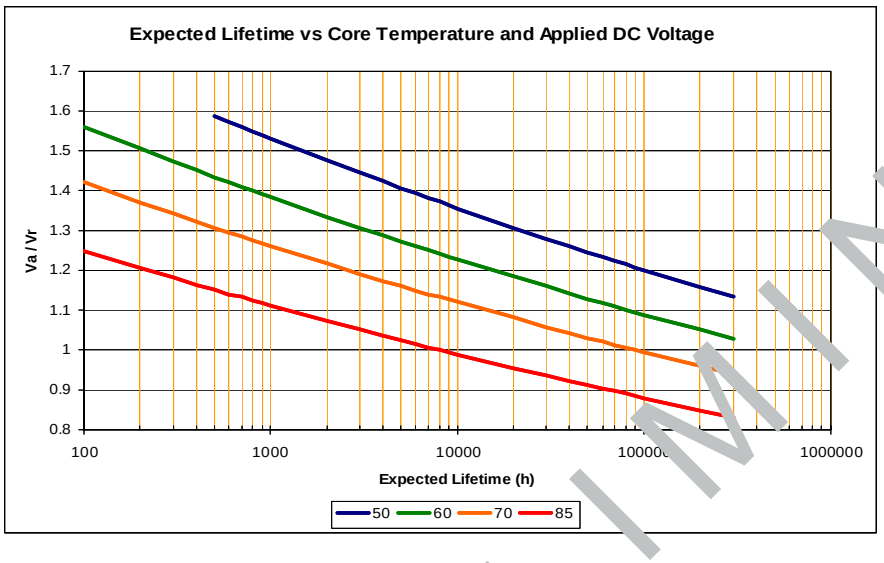
Part Numbering System

947C	331	K	122	MS
Type	Capacitance	Tolerance	Voltage	Mounting Options
947C	211 = 210 µF	K = ±10 %	801 = 800 Vdc	MS = Mounting Stud M12
	331 = 330 µF		102 = 1000 Vdc	MSI = Mounting Stud (M12)
			122 = 1200 Vdc	with M8 threaded insert Term.
				I = M8 Threaded Insert Terminals
				M = M8 Threaded Stud

Outline Drawing





Frequency Multipliers
θcc (core-to-case thermal resistance)

Fq. f(kHz)	Fq. Multiplier (θcc)
0-10	1.0
20	1.2
30	1.3
40	1.4
50	1.5
60	1.6
70	1.7
80	1.8
90	1.9
100	2.0

Life Calculation and Capacitor Selection Procedure

Customer has selected a capacitor and wants to know the expected lifetime

Customer needs to already know:
- Ripple Current I (Arms)
- Frequency f (Hz)
- Ambient Temperature Ta (°C)
- Airflow velocity v (m/s)
- Applied DC voltage Va Vdc

1. Estimate ESR as 10 kHz ESR from data sheet plus 0.0002 / (2 π f c)
2. Compute total thermal resistance θ as θ = θ cc + θca where θcc is core-to-case thermal resistance from the data sheet table (adjust θcc for frequency from multiplier table if frequency >10 kHz) and θca is case-to-ambient thermal resistance calculated as θca = 1/[A(5+17(v+0.1)$^{0.66}$] where A is the surface area of the capacitor in square meters and v is the airflow velocity in m/s.
3. Compute the core temperature T as T = Ta +I^2 x ESR x θ
4. Look up estimated lifetime from "Lifetime vs T & Va/Vr Chart"
5. If estimated lifetime is too low, choose a capacitor with higher voltage rating, higher capacitance (thus lower ESR), or consider using multiple capacitors in parallel to share the ripple current.

Customer has a target lifetime and wants to select a capacitor

Customer needs to already know:
- Ripple Current I (Arms)
- Frequency f (Hz)
- Ambient Temperature Ta (°C)
- Airflow velocity v (m/s)
- Applied DC Voltage Va (VDC)

1. Select a rated voltage Vr > Va. Compute Va/Vr
2. Look up estimated lifetime from "Lifetime vs T & Va/Vr Chart" to ensure lifetime at Va and T > Ta is sufficient.
3. Select a candidate capacitor with rated voltage Vr.
4. Estimate the ESR of the selected capacitor as the 10 kHz ESR from data sheet plus 0.0002 / (2 π f c)
5. Compute total thermal resistance θ as θ = θcc + θca where θcc is core-to-case thermal resistance from the data sheet table.
6. Compute the core temperature T as T = Ta + I2 x ESR x θ
7. Look up estimated lifetime from "Lifetime vs T & Va/Vr Chart"
8. If estimated lifetime is too low, choose a capacitor with higher voltage rating, higher capacitance (thus lower ESR), or consider using multiple capacitors in parallel to share the ripple current.