C4C Series, Axial Round, 850 – 3,000 VDC/450 – 750 VAC

Electronic Components KEMET CHARGED.

Overview

The C4C Series is a polypropylene metallized film and polyester double-metallized foil with polyester tape wrapping filled with resin and tinned copper wires.

Applications

Typical applications include snubber, clamping, resonance, coupling/decoupling, pulse and blocking.

Benefits

- Self-healing
- Low losses
- High ripple current
- High contact reliability
- Suitable for high frequency applications
- PP metallized and PET double-sided metallized foil

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Part Number System

C4	C	A	M	U	B	3100	AA	0	J
Series	Type	Fire Protection	Rated Voltage (VDC)	Insulation	Lead Diameter (mm)	Capacitance Code (pF)	Packaging	Capacitor Length (mm)	Tolerance
C4 = MKP Capacitors	C = Round body, snubber application	A = No fire retardant S = Fire retardant (on request)	M = 850 P = 1,200 W = 2,000 Y = 3,000	U = Polyester tape & resin protection 0 = Uninsulated (on request)	B = 0.8 C = 1.0 D = 1.2	Digits 2 – 4 indicate the first three digits of the capacitance value. First digit indicates the number of zeros to be added.	AA = Bulk (Bag) – Straight Leads see "Dimensions Table"	0 = 33 1 = 44 3 = 58	J = 5% K = 10%

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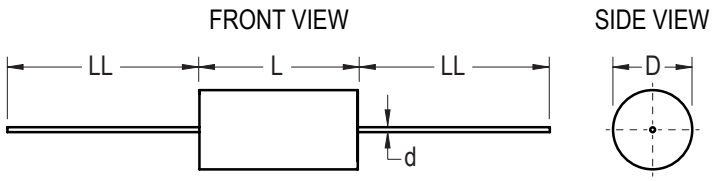
Dimensions – Millimeters



D	L	d	LL
Maximum	Maximum	Nominal	±5
10 – 14	33	0.8	40
14.5 – 21.5	33	1	40
19 – 23	44	1	40
23.5 – 33.5	44	1.2	40
28.5 – 32	58	1.2	40

Qualification

Reference Standards	VDE 0560, IEC 61071, EN 61071
Application Class (DIN 40040)	GPE/LS
Vibration Strength	DIN 40040, Table 6, Class V

Performance Characteristics

Temperature Range	-40°C to +85°C
Maximum Permissible Ambient Temperature	+70°C
IEC Climatic Category	40/85/56 according to IEC 68–1
Peak Non-Repetitive Maximum Current	I_{PKR} x 1.5
Test Voltage Terminal to Terminal (VTT)	2 V_n for 10 seconds
Test Voltage Terminal to Case (VTC)	3 k VDC 50 Hz for 60 seconds
Insulation Resistance Test Conditions	Temperature: +25°C ±5% Voltage charge time: 1 minute Test voltage: 100 VDC Typical value (Ris x C): 3,000 seconds
Dissipation Factor (DF)	≤ 5 x 10^{-4} at 1 kHz and 20°C
Capacitance Deviation in Operating Temperature Range of -40°C to +85°C	±1.5% maximum on capacitance value measured at +20°C
Life Expectancy	≥ 30,000 hours at V_{RMS}, ≥ 100,000 hours at V_n
Failure Quota	300/10^9 components per hour
Change of Capacitance vs. Operating Time	-3% after 30,000 hours at V_{RMS} or after 100,000 hours at V_n
Protection	Polyester wrapping with epoxy resin fill
Flame Retardant (IEC 384–1)	Standard execution: non-flame retardant On request: flame retardant execution Category C
Leads	Tinned copper (lead content = 5%)
Installation	Any position
Damp Heat Test	Test Conditions
	Relative humidity: 93% ± 2%
	Temperature: +40°C
	Test duration: 56 days
	Capacitance change: ≤ ± 5%
	DF change: ≤ 50% of nominal value at 1 kHz
	Insulation resistance: ≥ 50% of limit value

Table 1 – Ratings & Part Number Reference

Cap Value (µF)	VDC	VAC	Peak VDC	Maximum Dimensions (mm)		Ripple Current	Peak Current	ESR (Max)	dV/dt (V/µs)	Packaging Quantity	Part Number
				D	L	100 kHz 70°C (A)	(A)	100 kHz (mΩ)			
0.1	850	450	1200	10.5	33	5	45	16.6	450	300	C4C(1)M(2)B3100AA0(3)
0.15	850	450	1200	12.5	33	7	68	11.5	450	300	C4C(1)M(2)B3150AA0(3)
0.22	850	450	1200	15.5	33	9	99	8.1	450	200	C4C(1)M(2)C3220AA0(3)
0.33	850	450	1200	18.5	33	9	149	5.8	450	150	C4C(1)M(2)C3330AA0(3)
0.47	850	450	1200	21.5	33	9	212	4.6	450	100	C4C(1)M(2)C3470AA0(3)
0.68	850	450	1200	21	44	9	204	5.1	300	100	C4C(1)M(2)C3680AA1(3)
1	850	450	1200	25	44	12	300	3.8	300	50	C4C(1)M(2)D4100AA1(3)
1.5	850	450	1200	30.5	44	12	450	3.1	300	50	C4C(1)M(2)D4150AA1(3)
2	850	450	1200	28.5	58	12	400	3.8	200	30	C4C(1)M(2)D4200AA3(3)
2.2	850	450	1200	29.5	58	12	440	3.7	200	30	C4C(1)M(2)D4220AA3(3)
2.5	850	450	1200	31.5	58	12	500	3.5	200	30	C4C(1)M(2)D4250AA3(3)
0.047	1200	500	1600	10	33	4	33	27.1	700	400	C4C(1)P(2)B2470AA0(3)
0.068	1200	500	1600	12	33	5	48	19.1	700	300	C4C(1)P(2)B2680AA0(3)
0.1	1200	500	1600	14	33	7	70	13.4	700	250	C4C(1)P(2)B3100AA0(3)
0.15	1200	500	1600	17.5	33	9	105	9.2	700	150	C4C(1)P(2)C3150AA0(3)
0.22	1200	500	1600	20.5	33	9	154	6.8	700	100	C4C(1)P(2)C3220AA0(3)
0.33	1200	500	1600	20	44	9	149	7.2	450	100	C4C(1)P(2)C3330AA1(3)
0.47	1200	500	1600	23	44	9	212	5.6	450	70	C4C(1)P(2)C3470AA1(3)
0.68	1200	500	1600	27.5	44	12	306	4.2	450	50	C4C(1)P(2)D3680AA1(3)
1	1200	500	1600	33	44	12	450	3.5	450	50	C4C(1)P(2)D4100AA1(3)
1.2	1200	500	1600	29	58	12	330	4.5	275	30	C4C(1)P(2)D4120AA3(3)
1.5	1200	500	1600	32	58	12	413	4	275	30	C4C(1)P(2)D4150AA3(3)
0.022	2000	630	2400	10.5	33	3	25	48.2	1150	400	C4C(1)W(2)B2220AA0(3)
0.033	2000	630	2400	12.5	33	4	38	32.5	1150	300	C4C(1)W(2)B2330AA0(3)
0.047	2000	630	2400	15	33	6	54	23	1150	200	C4C(1)W(2)C2470AA0(3)
0.068	2000	630	2400	17.5	33	7	78	16.3	1150	150	C4C(1)W(2)C2680AA0(3)
0.1	2000	630	2400	20.5	33	9	115	11.6	1150	100	C4C(1)W(2)C3100AA0(3)
0.15	2000	630	2400	19.5	44	9	105	11.3	700	100	C4C(1)W(2)C3150AA1(3)
0.22	2000	630	2400	23.5	44	12	154	8	700	70	C4C(1)W(2)D3220AA1(3)
0.33	2000	630	2400	28.5	44	12	231	5.9	700	50	C4C(1)W(2)D3330AA1(3)
0.47	2000	630	2400	33.5	44	12	329	4.8	700	50	C4C(1)W(2)D3470AA1(3)
0.56	2000	630	2400	29	58	12	224	6.1	400	30	C4C(1)W(2)D3560AA3(3)
0.68	2000	630	2400	32	58	12	272	5.4	400	30	C4C(1)W(2)D3680AA3(3)
0.0068	3000	750	3500	10	33	2	14.5	132	2100	400	C4C(1)Y(2)B1680AA0(3)
0.01	3000	750	3500	12	33	3	21	90.3	2100	300	C4C(1)Y(2)B2100AA0(3)
0.015	3000	750	3500	14.5	33	4	32	60.5	2100	200	C4C(1)Y(2)C2150AA0(3)
0.022	3000	750	3500	17	33	5	46	41.6	2100	150	C4C(1)Y(2)C2220AA0(3)
0.033	3000	750	3500	20.5	33	6	69	28.3	2100	100	C4C(1)Y(2)C2330AA0(3)
0.047	3000	750	3500	19	44	7	59	25.7	1250	100	C4C(1)Y(2)C2470AA1(3)
0.068	3000	750	3500	22.5	44	9	85	18.3	1250	70	C4C(1)Y(2)C2680AA1(3)
0.1	3000	750	3500	27	44	12	125	12.8	1250	50	C4C(1)Y(2)D3100AA1(3)
0.15	3000	750	3500	32	44	12	188	9.2	1250	50	C4C(1)Y(2)D3150AA1(3)
0.22	3000	750	3500	31	58	12	165	9.5	750	30	C4C(1)Y(2)D3220AA3(3)
Capacitance Value (µF)	**VDC**	**VAC**	**Peak VDC**	**D (mm)**	**L (mm)**	**Ripple Current**	**Peak Current**	**ESR**	**dV/dt (V/µs)**	**Packaging Quantity**	**Part Number**

(1) A = No fire retardant; S = fire retardant (on request)
(2) U = Tape and resin protection; 0 = unprotected (on request)
(3) K = ±10%, J = ±5%

Environmental Compliance

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and the production of them.

In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, like Lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products to fulfill these legislative requirements. The only material of concern in our products has been Lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of Lead in any homogeneous material.

KEMET will closely follow any changes in legislation world wide and makes any necessary changes in its products, whenever needed. Some customer segments like Medical, Military and Automotive Electronics may still require the use of Lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Because of customer requirements there may appear additional markings like LF = Lead Free or LFW = Lead Free Wires on the label.

Materials & Environment

The selection of materials used by KEMET for the production of capacitors is the result of extensive experience and constant attention to environmental protection. KEMET selects its suppliers according to ISO 9001 standards and carries out statistical analysis on the materials purchased before acceptance. All materials are, to the company's present knowledge, non-toxic and free from Cadmium, Mercury, Chrome and compounds, PCB (Polychlorine Triphenyl), Bromide and Chlorine Dioxins Bromurate Clorurate, CFC and HCFC and Asbestos.

Green Products

All KEMET power film products are ROHS Compliant.

Insulation Resistance

When the capacitor temperature increases, the insulation resistance decreases. This is due to increased electron activity. Low insulation resistance can also be the result of moisture trapped in the windings, caused by a prolonged exposure to excessive humidity.

Dissipation Factor

Dissipation factor is a complex function involved with the inefficiency of the capacitor. The tgδ may change up and down with increased temperature. For more information, please refer to Performance Characteristics.

Sealing

Hermetically Sealed Capacitors

When the temperature increases, the pressure inside the capacitor increases. If the internal pressure is high enough, it can cause a breach in the capacitor which can result in leakage, impregnation, filling fluid or moisture susceptibility.

Resin Encased/Wrap & Fill Capacitors

The resin seals on resin encased and wrap and fill capacitors will withstand short-term exposure to high humidity environments without degradation. Resins and plastic tapes will form a pseudo-impervious barrier to humidity and chemicals. These case materials are somewhat porous and through osmosis can cause contaminants to enter the capacitor. The second area of contaminated absorption is the lead-wire/resin interface. Since resins cannot bond 100% to tinned wires, there can be a path formed up to the lead wire into the capacitor section. Aqueous cleaning of circuit boards can aggravate this condition.

Barometric Pressure

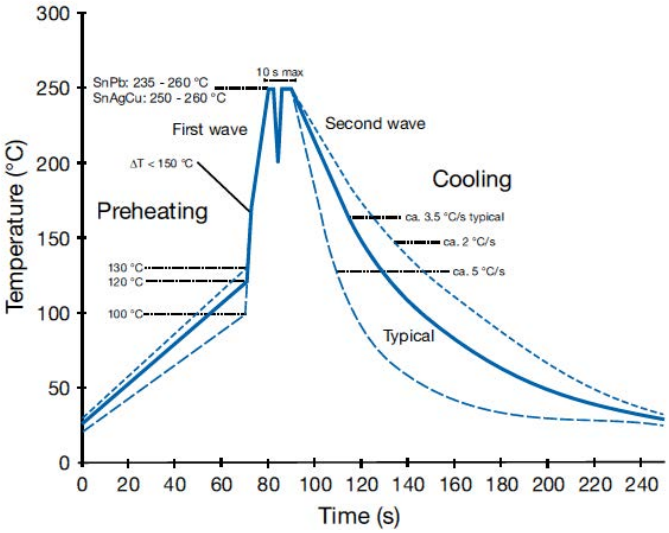
The altitude at which hermetically sealed capacitors are operated controls the voltage rating of the capacitor. As the barometric pressure decreases, the susceptibility to terminal arc-over increases. Non-hermetic capacitors can be affected by internal stresses due to pressure changes. This can be in the form of capacitance changes or dielectric arc-over as well as low insulation resistance. Heat transfer can also be affected by altitude operation. Heat generated in operation cannot be dissipated properly and can result in high RI2 losses and eventual failure.

Radiation

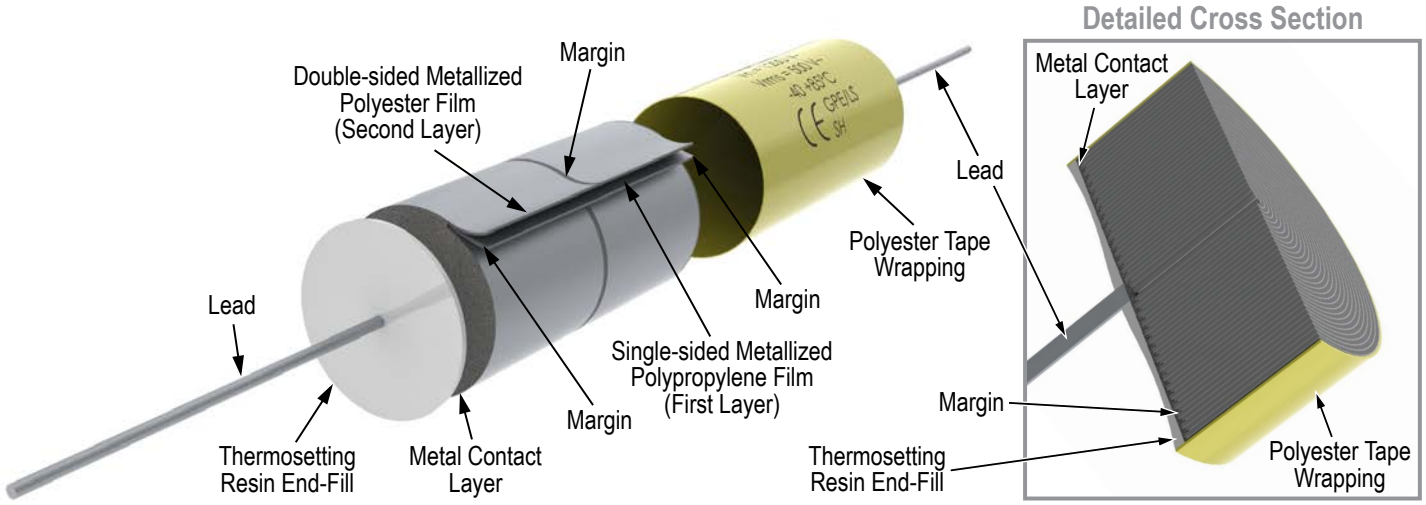
Radiation capabilities of capacitors must be taken into consideration. Electrical degradation in the form of dielectric embitterment can take place causing shorts or opens.

Soldering Process

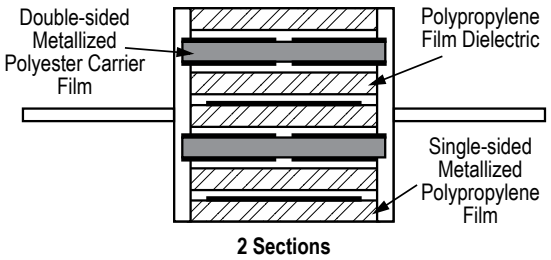
The implementation of the RoHS Directive has required the selection SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183ºC for SnPb eutectic alloy to 217ºC – 221ºC for the new alloys. As a result, the heat stress to components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (melting point of polypropylene is 160ºC – 170ºC). Wave soldering can be destructive especially for mechanically small polypropylene capacitors (lead spacings 5 – 10 mm) and great care must be taken during soldering. The solder profiles from KEMET are highly recommended. You may also refer to the wave soldering curve from IEC Publication 61760 – 1 Edition 2. Please consult KEMET with any questions.



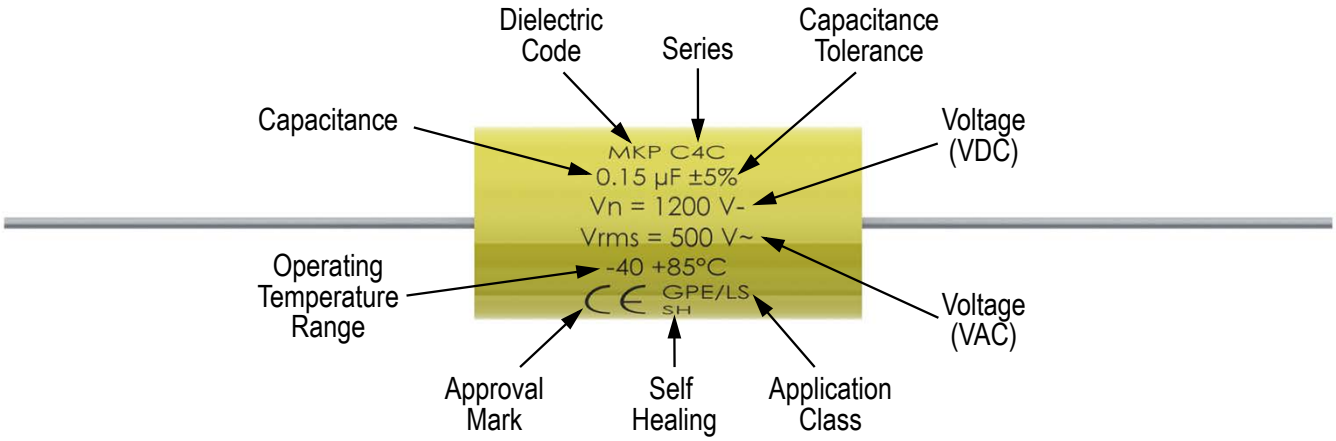
Construction



Winding Scheme



Marking


Dielectric Code
Series
Capacitance Tolerance
Capacitance
Voltage (VDC)
MKP C4C
0.15 µF ±5%
Vn = 1200 V-
Vrms = 500 V~
-40 +85°C
GPE/LS
SH
Operating Temperature Range
Voltage (VAC)
Approval Mark
Self Healing
Application Class

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(4) The Customer assumes the risk ofany and alluses that the Customer makes of the prototype samples.

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