Printed Circuit Board Mount Power Film Capacitors

C4G, Axial Round, 250 – 850 VDC/160 – 450 VAC

Overview

The C4G capacitor is a polypropylene metallized film capacitor with a polyester tape wrapping filled with resin, and uses tinned copper wires.

Applications

Typical applications include clamping, blocking, coupling/decoupling, AC harmonic filtering, and low power.

Benefits

- Self-healing
- Low loss
- High ripple current
- High contact reliability
- Suitable for high frequency applications
- PP metallized

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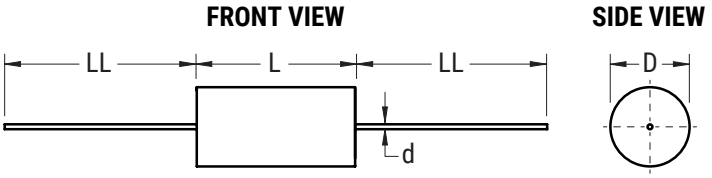
Part Number System

C4	G	A	D	U	B	4100	AA	4	J
Series	Type	Fire Protection	Rated Voltage (VDC)	Insulation	Lead Diameter (mm)	Capacitance Code (pF)	Packaging	Capacitor Length (mm)	Tolerance
C4 = MKP Capacitors	G = Round body, switching application	A = No fire retardant S = Fire retardant (on request)	D = 250 F = 400 H = 600 J = 700 M = 850	U = Polyester tape and 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	4 = 20.5 5 = 28 0 = 33 1 = 44 3 = 58	J = 5% K = 10%

Dimensions – Millimeters



D	L	d	LL
Maximum	Maximum	Nominal	±5
11	20.5	0.8	40
9.5	28	0.8	40
10 – 13	33	0.8	40
13.5 – 20.5	33	1	40
18 – 22.5	44	1	40
23.5 – 33	44	1.2	40
28 – 35	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 (Maximum)	dV/dt (V/µs)	Packaging Quantity	Part Number
				D	L	100 kHz 70°C (A)	(A)	100 kHz (mΩ)			
1	250	160	400	11	20.5	6	60	6.7	60	500	C4G(1)D(2)B4100AA4(3)
2.2	250	160	400	11.5	33	6	66	10.9	30	300	C4G(1)D(2)B4220AA0(3)
2.5	250	160	400	12	33	7	75	9.8	30	300	C4G(1)D(2)B4250AA0(3)
3	250	160	400	13.5	33	8	90	8.2	30	250	C4G(1)D(2)C4300AA0(3)
3.3	250	160	400	14	33	9	99	7.5	30	250	C4G(1)D(2)C4330AA0(3)
4	250	160	400	15.5	33	9	120	6.4	30	200	C4G(1)D(2)C4400AA0(3)
5	250	160	400	17	33	9	150	5.4	30	150	C4G(1)D(2)C4500AA0(3)
6.8	250	160	400	19.5	33	9	204	4.4	30	100	C4G(1)D(2)C4680AA0(3)
10	250	160	400	20	44	9	200	5.3	20	100	C4G(1)D(2)C5100AA1(3)
15	250	160	400	24.5	44	12	300	3.9	20	50	C4G(1)D(2)D5150AA1(3)
20	250	160	400	28	44	12	400	3.4	20	50	C4G(1)D(2)D5200AA1(3)
25	250	160	400	31	44	12	500	3.1	20	50	C4G(1)D(2)D5250AA1(3)
30	250	160	400	29	58	12	450	4	15	30	C4G(1)D(2)D5300AA3(3)
40	250	160	400	33.5	58	12	600	3.5	15	30	C4G(1)D(2)D5400AA3(3)
0.47	400	250	600	9.5	28	6	28	11.1	60	600	C4G(1)F(2)B3470AA5(3)
0.68	400	250	600	10	33	6	31	11.7	45	400	C4G(1)F(2)B3680AA0(3)
1	400	250	600	12	33	7	45	8.3	45	300	C4G(1)F(2)B4100AA0(3)
1.5	400	250	600	14.5	33	9	68	5.8	45	200	C4G(1)F(2)C4150AA0(3)
2	400	250	600	16.5	33	9	90	4.7	45	200	C4G(1)F(2)C4200AA0(3)
2.2	400	250	600	17.5	33	9	99	4.4	45	150	C4G(1)F(2)C4220AA0(3)
2.5	400	250	600	18.5	33	9	113	4	45	150	C4G(1)F(2)C4250AA0(3)
3	400	250	600	20	33	9	135	3.6	45	100	C4G(1)F(2)C4300AA0(3)
3.3	400	250	600	18	44	9	99	5.2	30	100	C4G(1)F(2)C4330AA1(3)
4	400	250	600	19.5	44	9	120	4.6	30	100	C4G(1)F(2)C4400AA1(3)
4.7	400	250	600	21	44	9	141	4.1	30	100	C4G(1)F(2)C4470AA1(3)
5	400	250	600	21.5	44	9	150	4	30	100	C4G(1)F(2)C4500AA1(3)
6.8	400	250	600	25	44	12	204	3.2	30	50	C4G(1)F(2)D4680AA1(3)
10	400	250	600	30	44	12	300	2.7	30	50	C4G(1)F(2)D5100AA1(3)
15	400	250	600	31.5	58	12	300	4.8	20	30	C4G(1)F(2)D5150AA3(3)
20	400	250	600	35	58	12	400	4	20	30	C4G(1)F(2)D5200AA3(3)
0.47	600	330	800	11	33	6	28	13.1	60	300	C4G(1)H(2)B3470AA0(3)
0.68	600	330	800	13	33	7	41	9.4	60	300	C4G(1)H(2)B3680AA0(3)
1	600	330	800	15.5	33	9	60	6.6	60	200	C4G(1)H(2)C4100AA0(3)
2	600	330	800	18.5	44	9	80	6.3	40	100	C4G(1)H(2)C4200AA1(3)
2.2	600	330	800	19.5	44	9	88	5.2	40	100	C4G(1)H(2)C4220AA1(3)
3	600	330	800	22.5	44	9	120	4.8	40	70	C4G(1)H(2)C4300AA1(3)
3.3	600	330	800	23.5	44	12	132	4.3	40	70	C4G(1)H(2)D4330AA1(3)
4	600	330	800	25.5	44	12	160	3.8	40	50	C4G(1)H(2)D4400AA1(3)
4.7	600	330	800	27.5	44	12	188	3.5	40	50	C4G(1)H(2)D4470AA1(3)
5	600	330	800	28.5	44	12	200	3.4	40	50	C4G(1)H(2)D4500AA1(3)
6.8	600	330	800	28.5	58	12	204	6.8	30	30	C4G(1)H(2)D4680AA3(3)
10	600	330	800	34.5	58	12	300	5.3	30	30	C4G(1)H(2)D5100AA3(3)
0.47	700	400	1,000	14.5	33	8	38	9.5	80	200	C4G(1)J(2)C3470AA0(3)
0.68	700	400	1,000	17	33	9	55	7	80	150	C4G(1)J(2)C3680AA0(3)
1	700	400	1,000	20.5	33	9	80	5.2	80	100	C4G(1)J(2)C4100AA0(3)
1.5	700	400	1,000	20.5	44	9	90	6.4	60	100	C4G(1)J(2)C4150AA1(3)
2	700	400	1,000	23.5	44	12	120	5	60	70	C4G(1)J(2)D4200AA1(3)
2.2	700	400	1,000	24.5	44	12	132	4.7	60	50	C4G(1)J(2)D4220AA1(3)
3	700	400	1,000	28.5	44	12	180	3.9	60	50	C4G(1)J(2)D4300AA1(3)
3.3	700	400	1,000	30	44	12	198	3.7	60	50	C4G(1)J(2)D4330AA1(3)
4	700	400	1,000	33	44	12	240	3.5	60	50	C4G(1)J(2)D4400AA1(3)
4.7	700	400	1,000	29.5	58	12	188	7.9	40	30	C4G(1)J(2)D4470AA3(3)
5	700	400	1,000	30.5	58	12	200	7.5	40	30	C4G(1)J(2)D4500AA3(3)
6.8	700	400	1,000	35	58	12	272	6.1	40	30	C4G(1)J(2)D4680AA3(3)
Capacitance Value (µF)	**VDC**	**VAC**	**D (mm)**	**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%

Table 1 – Ratings & Part Number Reference cont.

Cap Value (µF)	VDC	VAC	Peak VDC	Maximum Dimensions (mm)		Ripple Current	Peak Current	ESR (Maximum)	dV/dt (V/µs)	Packaging Quantity	Part Number
				D	L	100 kHz 70°C (A)	(A)	100 kHz (mΩ)			
0.15	850	450	1,200	10	33	5	32	14.5	210	400	C4G(1)M(2)B3150AA0(3)
0.22	850	450	1,200	12	33	7	46	10.3	210	300	C4G(1)M(2)B3220AA0(3)
0.33	850	450	1,200	14.5	33	9	69	7.1	210	200	C4G(1)M(2)C3330AA0(3)
0.47	850	450	1,200	17	33	9	99	5.4	210	150	C4G(1)M(2)C3470AA0(3)
0.68	850	450	1,200	20.5	33	9	143	4.2	210	100	C4G(1)M(2)C3680AA0(3)
1	850	450	1,200	20.5	44	9	140	4.7	140	100	C4G(1)M(2)C4100AA1(3)
1.5	850	450	1,200	24.5	44	12	210	3.5	140	70	C4G(1)M(2)D4150AA1(3)
2	850	450	1,200	28.5	44	12	280	3.1	140	50	C4G(1)M(2)D4200AA1(3)
2.2	850	450	1,200	29.5	44	12	308	3	140	50	C4G(1)M(2)D4220AA1(3)
2.5	850	450	1,200	31.5	44	12	350	2.9	140	50	C4G(1)M(2)D4250AA1(3)
3	850	450	1,200	28	58	12	270	3.6	90	30	C4G(1)M(2)D4300AA3(3)
3.3	850	450	1,200	29.5	58	12	297	3.5	90	30	C4G(1)M(2)D4330AA3(3)
4	850	450	1,200	32.5	58	12	360	3.2	90	30	C4G(1)M(2)D4400AA3(3)
Capacitance Value (µF)	**VDC**	**VAC**	**D (mm)**	**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 a leading global supplier of electronic components and an environmentally conscious company, KEMET continually aspires to improve the environmental effects of our manufacturing processes and our finished electronic components.

In Europe (RoHS Directive) and in some other geographical areas such as China (China RoHS), legislation has been enacted to prevent or otherwise limit the use of certain hazardous materials, including lead (Pb), in electronic equipment. KEMET monitors legislation globally to ensure compliance and endeavors to adjust our manufacturing processes and/or electronic components as may be required by applicable law.

For military, medical, automotive, and some commercial applications, the use of lead (Pb) in the termination is necessary and/or required by design. KEMET is committed to communicating RoHS compliance to our customers. Information related to RoHS compliance will be provided in data sheets and using specific identifiers on the packaging labels.

All KEMET power film capacitors are RoHS compliant.

Materials & Environment

The selection of raw materials that KEMET uses for the production of its electronic components is the result of extensive experience. KEMET directs specific attention toward environmental protection. KEMET selects its suppliers according to ISO 9001 standards and performs statistical analyses on raw materials before acceptance for use in manufacturing our electronic components. All materials are, to the best of KEMET's knowledge, non-toxic and free from cadmium; mercury; chrome and compounds; polychlorine triphenyl (PCB); bromide and chlorinedioxins bromurate clorurate; CFC and HCFC; and asbestos.

Dissipation Factor

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

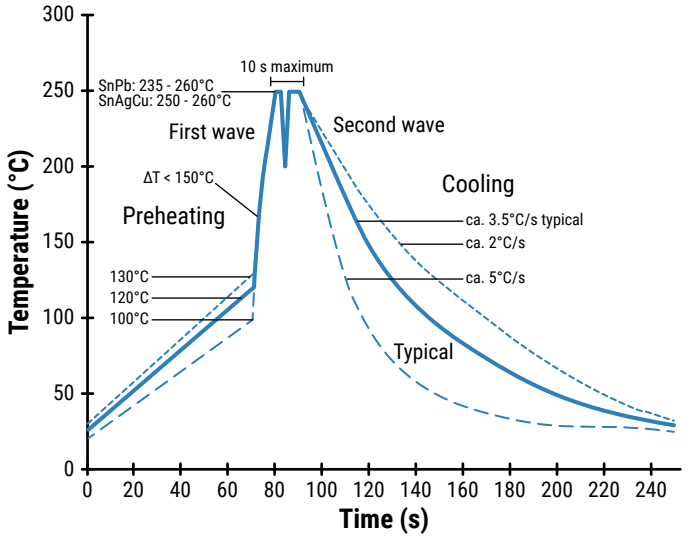
Sealing

Hermetically Sealed Capacitors
As the temperature increases, the pressure inside the capacitor increases. If the internal pressure is high enough, it can cause a breach in the capacitor. Such a breach can result in leakage, impregnation, filling fluid, or moisture susceptibility.

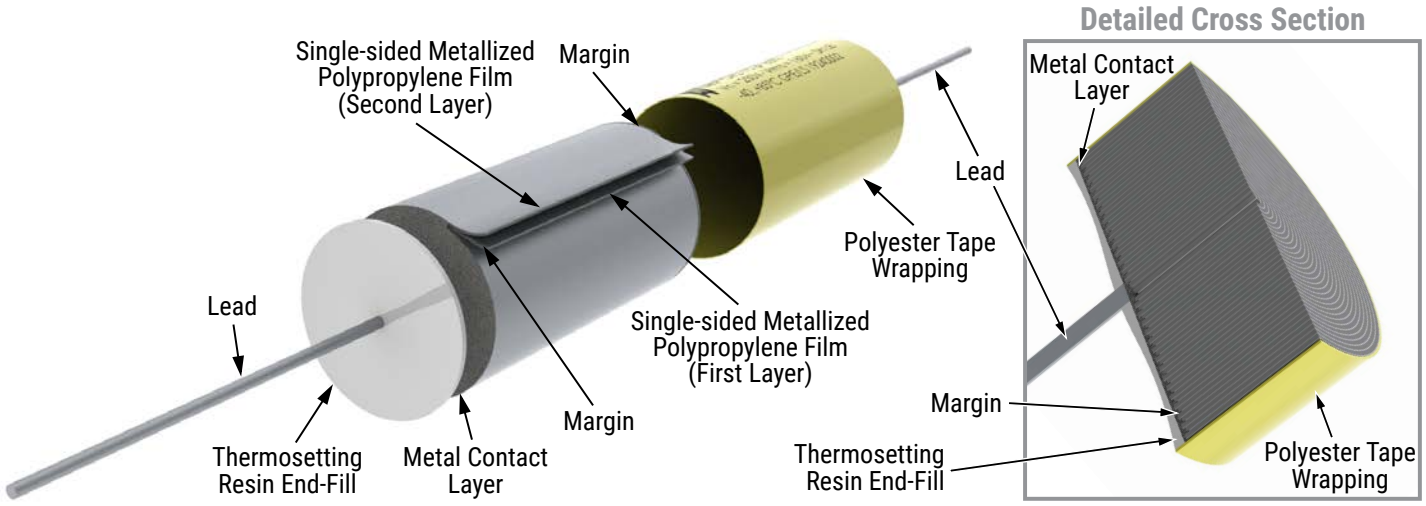
Barometric Pressure
The altitude at which hermetically sealed capacitors are operated controls the capacitor's voltage rating. As the barometric pressure decreases, the susceptibility to terminal arc-over increases. Non-hermetic capacitors can be affected by internal stresses due to pressure changes. These effects can be in the form of capacitance changes, dielectric arc-over, and/or low insulation resistance. Altitude can also affect heat transfer. Heat that is generated in an operation cannot be dissipated properly, and high RI^2 losses and eventual failure can result.

Soldering Process

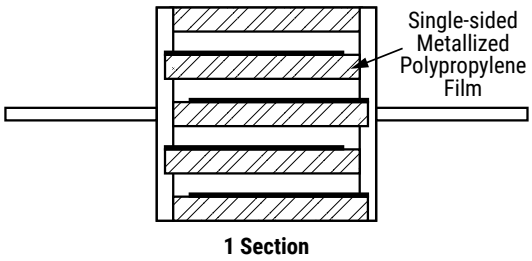
The implementation of the RoHS Directive has required the selection SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (melting point of polypropylene is 160 – 170°C). 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.



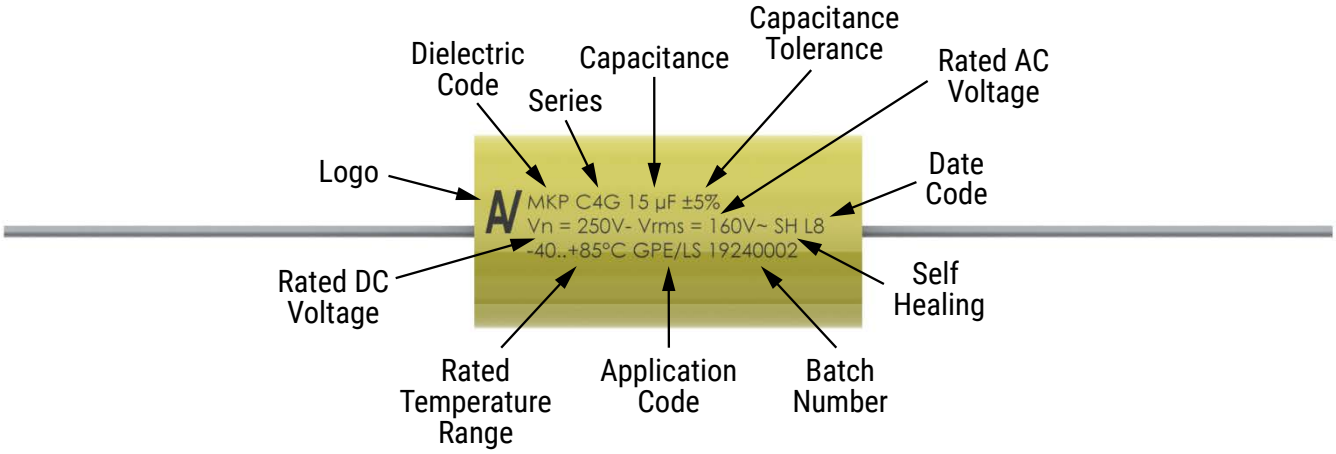
Construction



Winding Scheme



Marking


Dielectric Code
Capacitance
Capacitance Tolerance
Rated AC Voltage
Series
Logo
Date Code
MKP C4G 15 µF ±5%
Vn = 250V- Vrms = 160V~ SH L8
-40..+85°C GPE/LS 19240002
Rated DC Voltage
Self Healing
Rated Temperature Range
Application Code
Batch Number

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Although all product–related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicted or that other measures may not be required.