Electronic Components KEMET CHARGED®

C4AQ, Radial, 2 or 4 Leads, 500 - 1,500 VDC, for DC Link (Automotive Grade)

Overview

The C4AQ capacitor is a polypropylene metallized film capacitor with a rectangular, plastic box-type design (white or grey in color) filled with resin, and uses 2 or 4 tinned copper wires.

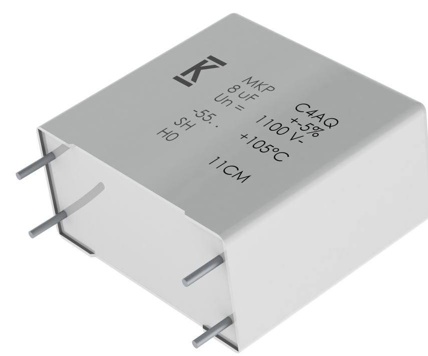
Automotive grade devices meet the demanding Automotive Electronics Council's AEC-Q200 qualification requirements.

Applications

Typical applications include DC filtering, DC link, power electronics, IGBT snubbers, energy storage, renewable energy grid interface, motor drives, and automotive applications.

Benefits

- Self-healing
- Low loss
- High ripple current
- High capacitance density
- High contact reliability
- Suitable for high frequency applications
- Automotive Grades (AEC-Q200)



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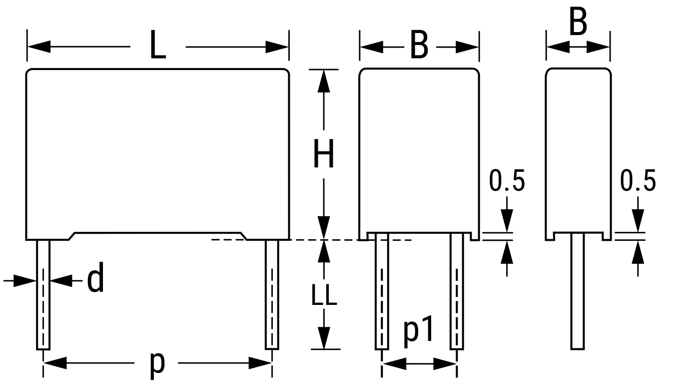
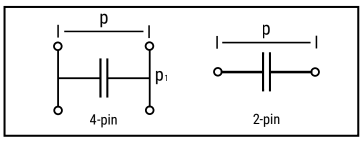
Part Number System

C4	A	Q	U	B	W	5270	A	3	N	J
Series	Type	Application	Rated Voltage (VDC)	Case	Terminals Code	Capacitance Code (pF)	C-Spec	Lead Diameter (mm)	Size Code: B x H x L (mm)	Tolerance
C4 = MKP Power Capacitors	A = Box, wire terminals	Q = DC Link Automotive Grade	L = 500 C = 650 I = 800 Q = 1,100 U = 1,300 S = 1,500	B = Box, plastic case E = Extended box, plastic case	U = 2 pins W = 4 pins	Digits two – four indicate the first three digits of the capacitance value. First digit indicates the number of zeros to be added.	A = Standard B – Z = Special	1 = 0.8 2 = 1.0 3 = 1.2	Digit 6 = B W = 11 x 20 x 31.5 X = 13 x 25 x 31.5 Y = 14 x 28 x 31.5 1 = 19 x 29 x 31.5 2 = 22 x 37 x 31.5 F = 20 x 40 x 42 J = 28 x 37 x 42 L = 30 x 45 x 42 O = 35 x 50 x 42 M = 30 x 45 x 57.5 N = 35 x 50 x 57.5 Digit 6 = E A = 45 x 56 x 57.5 B = 45 x 65 x 57.5	J = 5% K = 10%

Dimensions – Millimeters





Size Code		p		p1		B		H		L		LL		d	
Digit 6	Digit 14	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
B	W	27.5	±0.4	-	-	11.0	+0.3	20.0	+0.2	31.5	+0.5	6	+0/−2	0.8	±0.05
B	X	27.5	±0.4	-	-	13.0	+0.3	25.0	+0.2	31.5	+0.5	6	+0/−2	0.8	±0.05
B	Y	27.5	±0.4	-	-	14.0	+0.3	28.0	+0.2	31.5	+0.5	6	+0/−2	0.8	±0.05
B	1	27.5	±0.4	-	-	19.0	+0.3	29.0	+0.2	31.5	+0.5	6	+0/−2	0.8	±0.05
B	2	27.5	±0.4	-	-	22.0	+0.3	37.0	+0.2	31.5	+0.5	6	+0/−2	0.8	±0.05
B	F	37.5	±0.4	5.1/10.2	±0.4	20.0	+0.4	40.0	+0.2	42.0	+0.6	6	+0/−2	1.2	±0.05
B	J	37.5	±0.4	10.2	±0.4	28.0	+0.4	37.0	+0.2	42.0	+0.6	6	+0/−2	1.2	±0.05
B	L	37.5	±0.4	20.3	±0.4	30.0	+0.4	45.0	+0.2	42.0	+0.6	6	+0/−2	1.2	±0.05
B	O	37.5	±0.4	20.3	±0.4	35.0	+0.4	50.0	+0.2	42.0	+0.6	6	+0/−2	1.2	±0.05
B	M	52.5	±0.4	20.3	±0.4	30.0	+0.5	45.0	+0.3	57.5	+0.8	6	+0/−2	1.2	±0.05
B	N	52.5	±0.4	20.3	±0.4	35.0	+0.5	50.0	+0.3	57.5	+0.8	6	+0/−2	1.2	±0.05
E	A	52.5	±0.4	20.3	±0.4	45.0	+0.5	56.0	+0.3	57.5	+0.8	6	+0/−2	1.2	±0.05
E	B	52.5	±0.4	20.3	±0.4	45.0	+0.5	65.0	+0.3	57.5	+0.8	6	+0/−2	1.2	±0.05

Qualification

Reference Standards	IEC 61071, EN 61071, VDE0560
Climatic Category	55/105/56 according to IEC 60068-1

Automotive grade products meet or exceed the requirements outlined by the Automotive Electronics Council. Details regarding test methods and conditions are referenced in document AEC-Q200, Stress Test Qualification for Passive Components. For additional information regarding the Automotive Electronics Council and AEC-Q200, visit the AEC website at www.aecouncil.com.

General Technical Data

Dielectric	Polypropylene metallized film, non-inductive type, self-healing property
Application	DC filtering, DC link
Special Features	AEC–Q200 qualified
Climatic Category	55/105/56 IEC 60068–1
Maximum Operating Temperature	+105°C
Endurance Test	500 hours + 500 hours at 1.3 x V_{NDC} at 70°C
	500 hours + 500 hours at 1.3 x V_{OP85} at 85°C
	500 hours + 500 hours at 1.3 x V_{OP105} at 105°C
Standard	IEC 61071, EN 61071, VDE0560, AEC–Q200
Protection	Solvent resistant plastic case UL 94 V–0 compliant Thermosetting resin sealing UL 94 V–0 compliant
Installation	Any position
Leads	Tinned copper wires - standard lead wire length 6 (+0/–2) mm
Packaging	Packed in cardboard trays with protection for the terminals
RoHS Compliance	Compliant with Directive 2002/95/EC and Directive 2011/65/EU of the European Parliament and the Council of the EU on 8 June 2011, including the Commission Delegated Directive (EU) 2015/863 that amended Annex II to Directive 2011/65/EU.

Electrical Characteristics

Rated Capacitance Range	1 to 210 µF
Rated Voltage (V_{NDC}) Range	500 to 1,500 VDC
Capacitance Tolerance	±5% (J) or ±10% (K) measured at T = +25°C ±5°C
Dissipation Factor PP Typical (tgδ0)	≤ 0.0002 at 10 kHz with T = 25°C ±5°C
Surge Voltage	1.5 * V_{NDC} for maximum 10 times in a lifetime at 25°C ±5°C
Overvoltage (IEC 61071)	1.15 * V_{NDC} for maximum 30 minutes, once per day
	1.3 * V_{NDC} for maximum 1 minute, once per day
Peak Non-Repetitive Current	1.5 * I_{PKR} for maximum 1,000 times in a lifetime
Insulation Resistance	IR x C ≥ 30.000 seconds at 100 VDC 1 minute at T = +25°C ±5°C
Capacitance Deviation in Operation	±2.0% maximum on capacitance value measured at T = +25°C ±5°C
Temperature Storage	−40 to +80°C
Storage time	≤ 36 months from the date marked on the label glued to the package
Permissible Relative Humidity - Storage	Annual average ≤ 70%, 85% on 30 days/year randomly distributed throughout year. Dewing not admissible.

Life Expectancy

Life Expectancy	100,000 hours at V_{NDC} at hot spot temperature T_{HS} = +70°C
	100,000 hours at V_{OP85} at hot spot temperature T_{HS} = +85°C
	10,000 hours at V_{OP105} at hot spot temperature T_{HS} = +105°C
Capacitance Drop at End of Life	−5% (typical)
Failure Rate IEC 61709	≤ 300 FIT at V_{OP85} at hot spot temperature T_{HS} = +85°C
	≤ 200 FIT at V_{NDC} at hot spot temperature T_{HS} = +70°C

Test Method

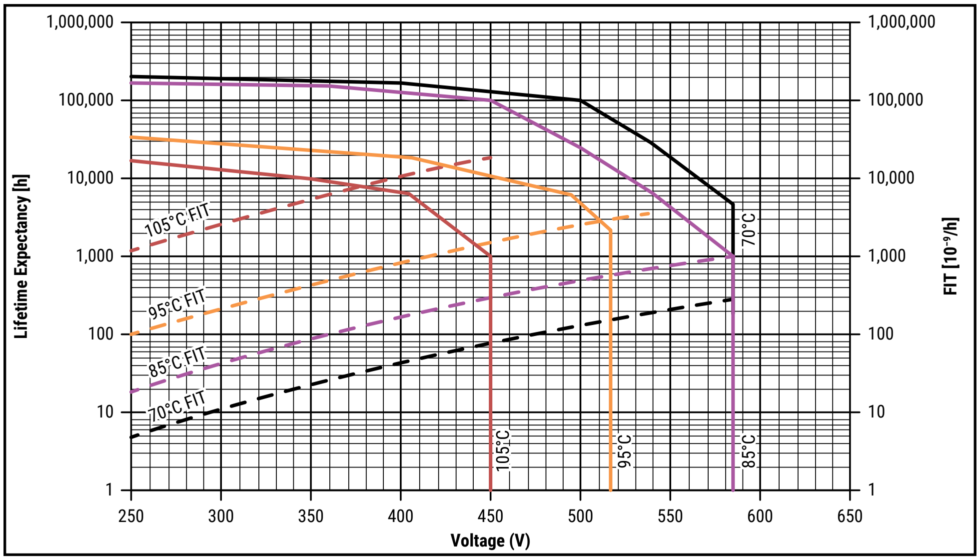
Test Voltage Between Terminals	1.5 * V_{NDC} for 10 seconds or 1.65 * V_{NDC} for 2 seconds, at T = +25°C ±5°C
Test Voltage Between Terminals and Case	3.2 k VAC 50 Hz for 2 seconds
Damp Heat	IEC 60068-2-78
Change of Temperature	IEC 60068-2-14
Biased Humidity Test 40°C/93% R.H. at V_{NDC} - 1,000 hours	$\lvert \Delta C/C_0 \rvert \le 5\%$ $\lvert \Delta DF/DF_0 \rvert \le 200\%$ (at 10 kHz) IR ≥ 50% of initial limit
Biased Humidity Test 60°C/95% R.H. at V_{NDC} - 1,000 hours	$\lvert \Delta C/C_0 \rvert \le 5\%$ $\lvert \Delta DF/DF_0 \rvert \le 200\%$ (at 10 kHz) IR ≥ 100 MΩ

Operative Voltage Derating

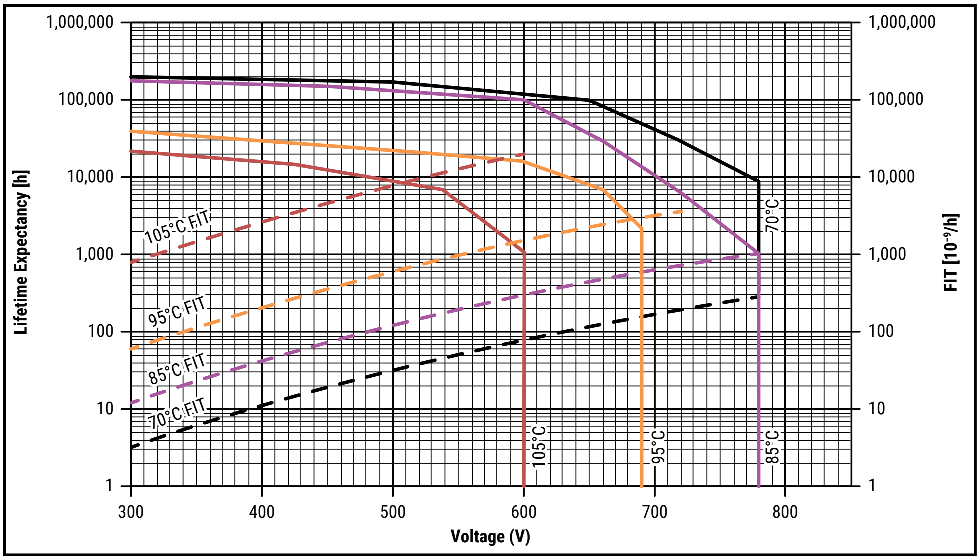
	Symbol	Voltage (VDC)						Life Expectancy (Hours)
Rated Voltage at 70°C (T_{HS})	V_{NDC}	500	650	800	1,100	1,300	1,500	100,000
Operating Voltage at 85°C (T_{HS})	V_{OP85}	450	600	700	900	1,100	1,200	100,000
Operating Voltage at 105°C (T_{HS})	V_{OP105}	350	450	550	700	850	900	10,000

Life Expectancy/Failure Quota Graphs

Lifetime Curve & FIT at Hot Spot Temperature - V_{NDC} = 500 VDC



Lifetime Curve & FIT at Hot Spot Temperature - V_{NDC} = 650 VDC



Notes:

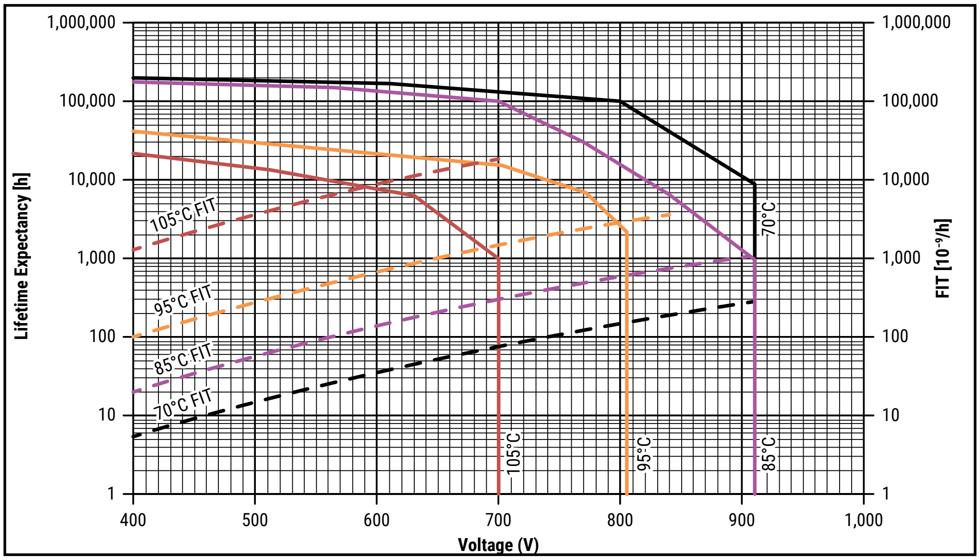
$T_{HS} = T_{AMB} + \Delta T$

$\Delta T = ESR * I_{rms}^2 * Rth$

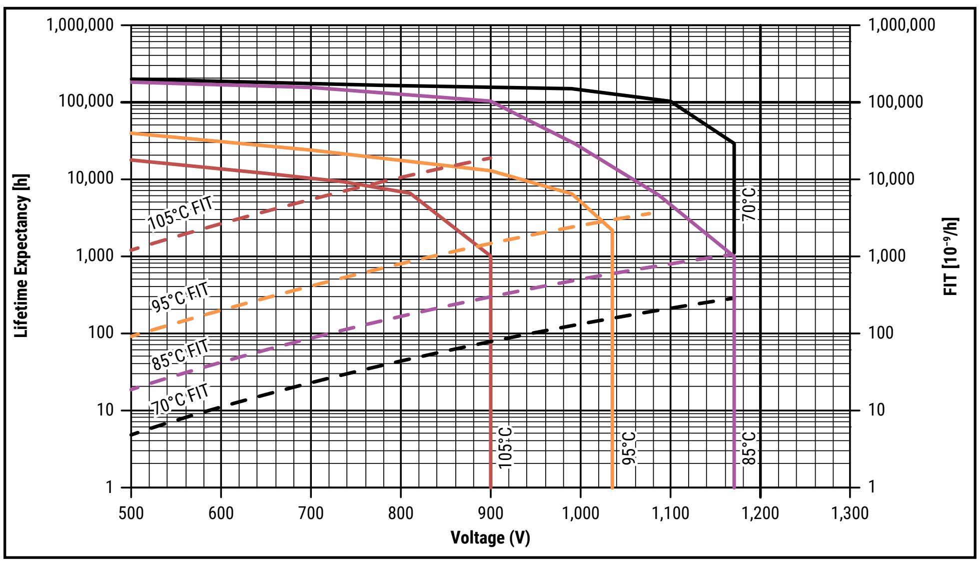
I_{rms} *should be limited to values granting* $\Delta T \leq 30°C$

Life Expectancy/Failure Quota Graphs cont'd.

Lifetime Curve & FIT at Hot Spot Temperature - V_{NDC} = 800 VDC



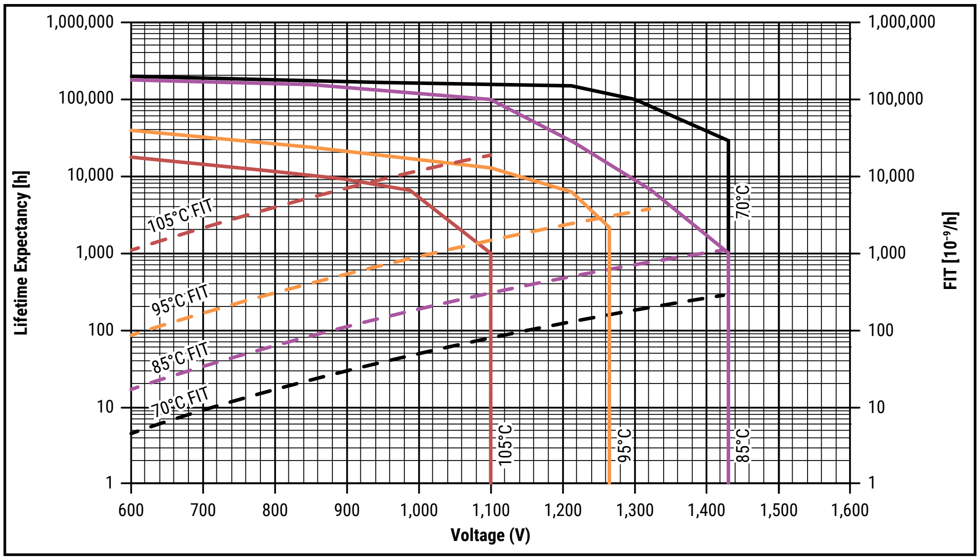
Lifetime Curve & FIT at Hot Spot Temperature - V_{NDC} = 1,100 VDC



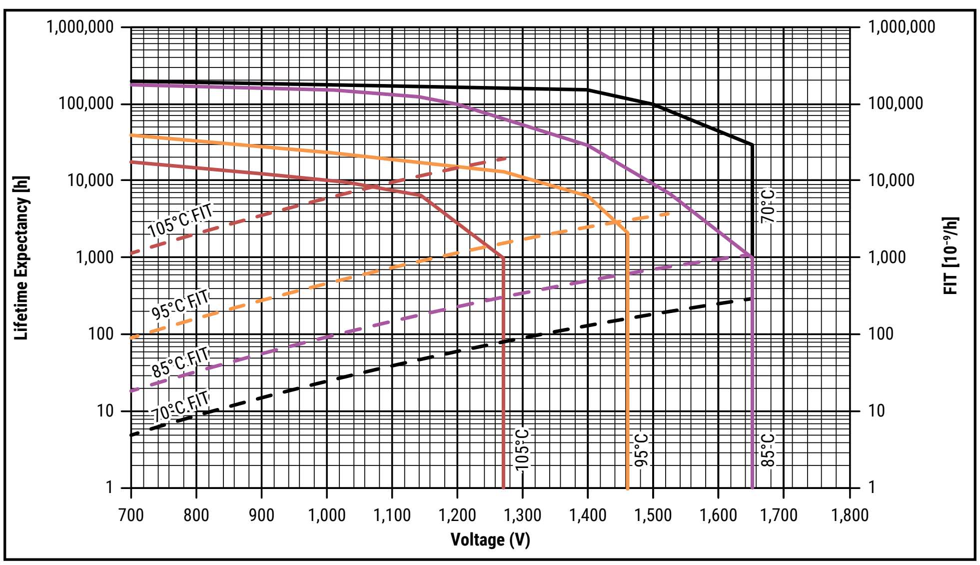
Notes:
$T_{HS} = T_{AMB} + \Delta T$
$\Delta T = ESR * I_{rms}^2 * Rth$
I_{rms} *should be limited to values granting* $\Delta T \leq 30°C$

Life Expectancy/Failure Quota Graphs cont'd.

Lifetime Curve & FIT at Hot Spot Temperature - V_{NDC} = 1,300 VDC



Lifetime Curve & FIT at Hot Spot Temperature - V_{NDC} = 1,500 VDC



Notes:
$T_{HS} = T_{AMB} + \Delta T$
$\Delta T = ESR * I_{rms}^2 * Rth$
I_{rms} *should be limited to values granting* $\Delta T \leq 30°C$

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 RI2 losses and eventual failure can result.

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.

Table 1 – Ratings & Part Number Reference

Cap Value (µF)	VDC	Dimensions (mm)					dV/dt	Ipkr	ESL	ESR 70°C at 10 kHz	Irms* 70°C at 10 kHz	Rth (HS/Amb)	Packaging Quantity	PART NUMBER
		B	H	L	P	P1	V/µs	Apk	nH	mΩ	Arms	(°C/W)		
V_{NDC} at 70°C = 500 VDC; V_{OP85} at 85°C = 450 VDC; V_{OP105} at 105°C = 350 VDC														
5.6	500	11	20	31.5	27.5	\	10	54	25	13.1	4.5	44	256	C4AQLBU4560A1WK
10	500	13	25	31.5	27.5	\	10	96	25	8.1	6.5	36	234	C4AQLBU5100A1XK
12.5	500	14	28	31.5	27.5	\	10	122	26	6.8	7.5	33	96	C4AQLBU5125A1YK
15	500	19	29	31.5	27.5	\	10	147	26	6	8.5	29	72	C4AQLBU5150A11K
25	500	22	37	31.5	27.5	\	10	245	28	4.5	11.5	23	64	C4AQLBU5250A12K
40	500	20	40	42	37.5	10.2	7	262	30	3.5	13.5	20	58	C4AQLBW5400A3FK
50	500	28	37	42	37.5	10.2	7	332	30	2.8	16	18	36	C4AQLBW5500A3JK
70	500	30	45	42	37.5	20.3	7	464	30	2.1	20.5	15	36	C4AQLBW5700A3LK
90	500	35	50	42	37.5	20.3	7	585	35	1.5	26	13	30	C4AQLBW5900A3OK
100	500	30	45	57.5	52.5	20.3	4	442	35	3	19	12	27	C4AQLBW6100A3MK
130	500	35	50	57.5	52.5	20.3	4	581	35	2.4	23	10	23	C4AQLBW6130A3NK
170 [1]	500	45	56	57.5	52.5	20.3	4	780	41	1.8	29.5	8	18	C4AQLEW6170A3AK
210 [1]	500	45	65	57.5	52.5	20.3	4	840	45	1.4	35.5	7	18	C4AQLEW6210A3BK
V_{NDC} at 70°C = 650 VDC; V_{OP85} at 85°C = 600 VDC; V_{OP105} at 105°C = 450 VDC														
3.3	650	11	20	31.5	27.5	\	13	41	25	17	4	44	256	C4AQCBU4330A1WJ
5.6	650	13	25	31.5	27.5	\	13	71	25	10.7	6	36	234	C4AQCBU4560A1XJ
7	650	14	28	31.5	27.5	\	13	88	26	9	7	33	96	C4AQCBU4700A1YJ
10	650	19	29	31.5	27.5	\	13	127	26	6.8	8.5	29	72	C4AQCBU5100A11J
15	650	22	37	31.5	27.5	\	13	190	28	5.3	10.5	23	64	C4AQCBU5150A12J
20	650	20	40	42	37.5	10.2	9	172	30	5.3	11	20	58	C4AQCBW5200A3FJ
30	650	28	37	42	37.5	10.2	9	255	30	3.6	14	18	36	C4AQCBW5300A3JJ
40	650	30	45	42	37.5	20.3	9	344	30	2.8	18	15	36	C4AQCBW5400A3LJ
50	650	35	50	42	37.5	20.3	9	430	35	2	22.5	13	30	C4AQCBW5500A3OJ
55	650	30	45	57.5	52.5	20.3	6	319	35	4.1	16.5	12	27	C4AQCBW5550A3MJ
75	650	35	50	57.5	52.5	20.3	6	435	35	3.1	20.5	10	23	C4AQCBW5750A3NJ
110 [1]	650	45	56	57.5	52.5	20.3	6	625	41	2.2	27	8	18	C4AQCEW6110A3AJ
130 [1]	650	45	65	57.5	52.5	20.3	6	754	45	1.7	32	7	18	C4AQCEW6130A3BJ
V_{NDC} at 70°C = 800 VDC; V_{OP85} at 85°C = 700 VDC; V_{OP105} at 105°C = 550 VDC														
2.7	800	11	20	31.5	27.5	\	19	51	25	18.3	4	44	256	C4AQIBU4270A1WJ
4	800	13	25	31.5	27.5	\	19	77	25	12.9	5.5	36	234	C4AQIBU4400A1XJ
5	800	14	28	31.5	27.5	\	19	96	26	10.7	6	33	96	C4AQIBU4500A1YJ
8	800	19	29	31.5	27.5	\	19	154	26	7.3	8	29	72	C4AQIBU4800A11J
12.5	800	22	37	31.5	27.5	\	19	241	28	5.5	10	23	64	C4AQIBU5125A12J
15	800	20	40	42	37.5	5.1	13	196	30	6.2	10	20	58	C4AQIBW5150A3FJ
15	800	20	40	42	37.5	10.2	13	196	30	6.2	10	20	58	C4AQIBW5150B3FJ
20	800	28	37	42	37.5	10.2	13	262	30	4.7	12.5	18	36	C4AQIBW5200A3JJ
30	800	30	45	42	37.5	20.3	13	389	30	3.2	16.5	15	36	C4AQIBW5300A3LJ
40	800	35	50	42	37.5	20.3	13	524	35	2.2	21.5	13	30	C4AQIBW5400A3OJ
45	800	30	45	57.5	52.5	20.3	9	389	35	4.4	16	12	27	C4AQIBW5450A3MJ
55	800	35	50	57.5	52.5	20.3	9	485	35	3.6	19	10	23	C4AQIBW5550A3NJ
60	800	35	50	57.5	52.5	20.3	9	530	35	3.4	19.5	10	23	C4AQIBW5600A3NJ
85 [1]	800	45	56	57.5	52.5	20.3	9	728	41	2.5	25.5	8	18	C4AQIEW5850A3AJ
100 [1]	800	45	65	57.5	52.5	20.3	9	883	45	1.9	30.5	7	18	C4AQIEW6100A3BJ
Cap Value (µF)	VDC	B	H	L	P	P1	V/µs	Apk	nH	mΩ	Arms	(°C/W)	Packaging Quantity	PART NUMBER
		Dimensions (mm)					dV/dt	Ipkr	ESL	ESR 70°C at 10 kHz	Irms* 70°C at 10 kHz	Rth (HS/Amb)		

[1] *Items available for sample.*

(*) I_{rms} value that leads to a ΔT of ≈ 15°C in the hot spot > $T_{HS} = T_{AMB} + \Delta T = 70°C + 15°C = 85°C$

Table 1 – Ratings & Part Number Reference cont'd.

Cap Value (µF)	VDC	Dimensions (mm)					dV/dt	Ipkr	ESL	ESR 70°C at 10 kHz	Irms* 70°C at 10 kHz	Rth (HS/Amb)	Packaging Quantity	PART NUMBER
		B	H	L	P	P1	V/µs	Apk	nH	mΩ	Arms	(°C/W)		
V_{NDC} at 70°C = 1,100 VDC; V_{OP85} at 85°C = 900 VDC; V_{OP105} at 105°C = 700 VDC														
1.5	1100	11	20	31.5	27.5	\	24	36	25	26.3	3.5	44	256	C4AQQBU4150A1WJ
2.7	1100	13	25	31.5	27.5	\	24	65	25	15.3	5	36	234	C4AQQBU4270A1XJ
3.3	1100	14	28	31.5	27.5	\	24	79	26	12.9	5.5	33	96	C4AQQBU4330A1YJ
5	1100	19	29	31.5	27.5	\	24	120	26	9.1	7	29	72	C4AQQBU4500A11J
8	1100	22	37	31.5	27.5	\	24	193	28	6.6	9.5	23	64	C4AQQBU4800A12J
12	1100	20	40	42	37.5	10.2	16	190	30	6.3	10	20	58	C4AQQBW5120A3FJ
14	1100	28	37	42	37.5	10.2	16	229	30	5.4	11.5	18	36	C4AQQBW5140A3JJ
20	1100	30	45	42	37.5	20.3	16	321	30	3.9	15	15	36	C4AQQBW5200A3LJ
25	1100	35	50	42	37.5	20.3	16	409	35	2.8	19	13	30	C4AQQBW5250A3OJ
30	1100	30	45	57.5	52.5	20.3	11	324	35	5.2	15	12	27	C4AQQBW5300A3MJ
40	1100	35	50	57.5	52.5	20.3	11	428	35	4	18	10	23	C4AQQBW5400A3NJ
55 [1]	1100	45	56	57.5	52.5	20.3	11	595	41	2.6	24.5	8	18	C4AQQEW5550A3AJ
65 [1]	1100	45	65	57.5	52.5	20.3	11	717	45	2.3	28	7	18	C4AQQEW5650A3BJ
V_{NDC} at 70°C = 1,300 VDC; V_{OP85} at 85°C = 1,100 VDC; V_{OP105} at 105°C = 850 VDC														
1	1300	11	20	31.5	27.5	\	28	28	25	33.1	3	44	256	C4AQUBU4100A1WJ
1.8	1300	13	25	31.5	27.5	\	29	52	25	19.1	4.5	36	234	C4AQUBU4180A1XJ
2.2	1300	14	28	31.5	27.5	\	29	63	26	16	5	33	96	C4AQUBU4220A1YJ
3.3	1300	19	29	31.5	27.5	\	29	95	26	11.2	6.5	29	72	C4AQUBU4330A11J
5	1300	22	37	31.5	27.5	\	29	145	28	8.2	8.5	23	64	C4AQUBU4500A12J
8	1300	20	40	42	37.5	10.2	20	157	30	7.9	9	20	58	C4AQUBW4800A3FJ
10	1300	28	37	42	37.5	10.2	20	196	30	6.3	11	18	36	C4AQUBW5100A3JJ
12	1300	30	45	42	37.5	20.3	20	235	30	5.3	13	15	36	C4AQUBW5120A3LJ
18	1300	35	50	42	37.5	20.3	19	350	35	3.2	18	13	30	C4AQUBW5180A3OJ
20	1300	30	45	57.5	52.5	20.3	13	262	35	6.5	13	12	27	C4AQUBW5200A3MJ
25	1300	35	50	57.5	52.5	20.3	13	331	35	5.2	16	10	23	C4AQUBW5250A3NJ
27	1300	35	50	57.5	52.5	20.3	13	354	35	4.9	16.5	10	23	C4AQUBW5270A3NJ
38 [1]	1300	45	56	57.5	52.5	20.3	13	498	41	3.1	22.5	8	18	C4AQUEW5380A3AJ
45 [1]	1300	45	65	57.5	52.5	20.3	13	596	45	2.7	26	7	18	C4AQUEW5450A3BJ
V_{NDC} at 70°C = 1,500 VDC; V_{OP85} at 85°C = 1,200 VDC; V_{OP105} at 105°C = 900 VDC														
1.0	1500	11	20	31.5	27.5	\	31	31	24	25.7	3.5	44	256	C4AQSBU4100A1WJ
1.5	1500	13	25	31.5	27.5	\	31	49	25	17.7	4.5	36	234	C4AQSBU4150A1XJ
2.0	1500	14	28	31.5	27.5	\	32	65	26	14.1	5.5	33	96	C4AQSBU4200A1YJ
3.0	1500	19	29	31.5	27.5	\	32	95	26	9.7	7	29	72	C4AQSBU4300A11J
4.5	1500	22	37	31.5	27.5	\	33	148	28	7.3	9	23	64	C4AQSBU4450A12J
6.0	1500	20	40	42	37.5	10.2	22	132	30	8	9	20	58	C4AQSBW4600A3FJ
8.0	1500	28	37	42	37.5	10.2	22	176	30	6	11	18	36	C4AQSBW4800A3JJ
12	1500	30	45	42	37.5	20.3	22	256	33	4.1	14.5	15	36	C4AQSBW5120A3LJ
15	1500	35	50	42	37.5	20.3	22	326	35	3.5	17.5	13	30	C4AQSBW5150A3OJ
17	1500	30	45	57.5	52.5	20.3	14	236	35	5.9	13.5	12	27	C4AQSBW5170A3MJ
22	1500	35	50	57.5	52.5	20.3	14	308	38	4.6	17	10	23	C4AQSBW5220A3NJ
32 [1]	1500	45	56	57.5	52.5	20.3	14	460	41	3.4	22	8	18	C4AQSEW5320A3AJ
40 [1]	1500	45	65	57.5	52.5	20.3	14	562	45	2.8	25	7	18	C4AQSEW5400A3BJ
		B	H	L	P	P1	V/µs	Apk	nH	mΩ	Arms	(°C/W)		
Cap Value (µF)	VDC	Dimensions (mm)					dV/dt	Ipkr	ESL	ESR 70°C at 10 kHz	Irms* 70°C at 10 kHz	Rth (HS/Amb)	Packaging Quantity	PART NUMBER

[1] *Items available for sample.*

(*) I_{rms} value that leads to a ΔT of ≈ 15°C in the hot spot > $T_{HS} = T_{AMB} + \Delta T = 70°C + 15°C = 85°C$

Soldering Process

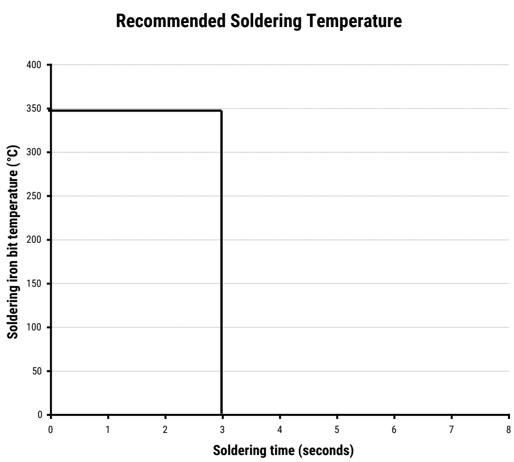
The implementation of the RoHS directive has resulted in the selection of SnAuCu (SAC) alloys, or SnCu alloys, as the primary solder material. This has increased the liquidus temperature from 183°C for a SnPb eutectic alloy to 217 – 221°C for new alloys. As a result, the heat stress to the components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (the melting point of polypropylene is 160 – 170°C). Wave soldering can be destructive, especially for mechanically small polypropylene capacitors (with lead spacing of 5 – 15 mm), and great care must be taken during soldering. The recommended solder profiles from KEMET should be used. Contact KEMET with any questions. In general, the wave soldering curve from IEC Publication 61760–1 Edition 2 serves as a solid guideline for successful soldering. See Figure 1.

Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the recommended limits may result in degradation or permanent damage to the capacitors.

Do not place the polypropylene capacitor through an adhesive curing oven to cure resin for surface mount components. Insert through-hole parts after curing the surface mount parts. Contact KEMET to discuss the actual temperature profile in the oven, if through-hole components must pass through the adhesive curing process. A maximum two soldering cycles is recommended. Allow time for the capacitor surface temperature to return to normal before the second soldering cycle.

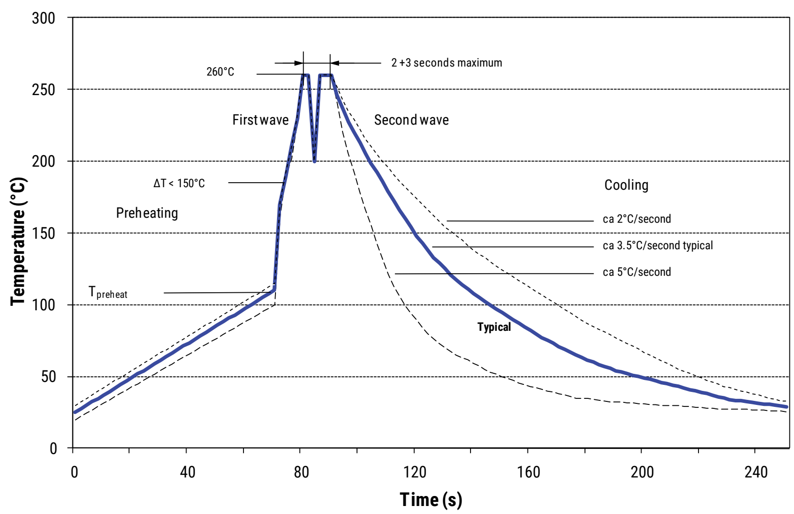
Manual Soldering Recommendations

Following is the recommendation for manual soldering with a soldering iron.



The soldering iron tip temperature should be set at 350°C (+10°C maximum) with the soldering duration not to exceed more than 3 seconds.

Wave Soldering Recommendations



Soldering Process cont'd

Wave Soldering Recommendations cont'd

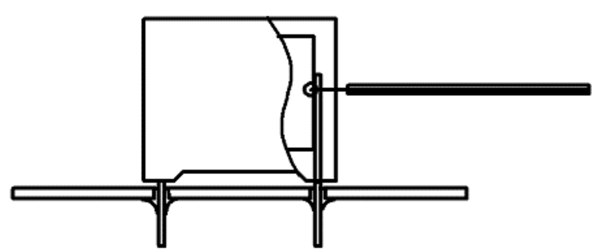
1. The tables indicates the maximum set-up temperature of the soldering process

Dielectric Film Material	Maximum Preheat Temperature			Maximum Peak Soldering Temperature	
	Capacitor Pitch ≤ 10 mm	Capacitor Pitch = 15 mm	Capacitor Pitch > 15 mm	Capacitor Pitch ≤ 15 mm	Capacitor Pitch > 15 mm
Polyester	130°C	130°C	130°C	270°C	270°C
Polypropylene	100°C	110°C	130°C	260°C	270°C
Paper	130°C	130°C	140°C	270°C	270°C
Polyphenylene Sulphide	150°C	150°C	160°C	270°C	270°C

2. The maximum temperature measured inside the capacitor: set the temperature so that inside the element the maximum temperature is below the limit.

Dielectric Film Material	Maximum Temperature Measured Inside the Element
Polyester	160°C
Polypropylene	110°C
Paper	160°C
Polyphenylene Sulphide	160°C

Temperature monitored inside the capacitor.

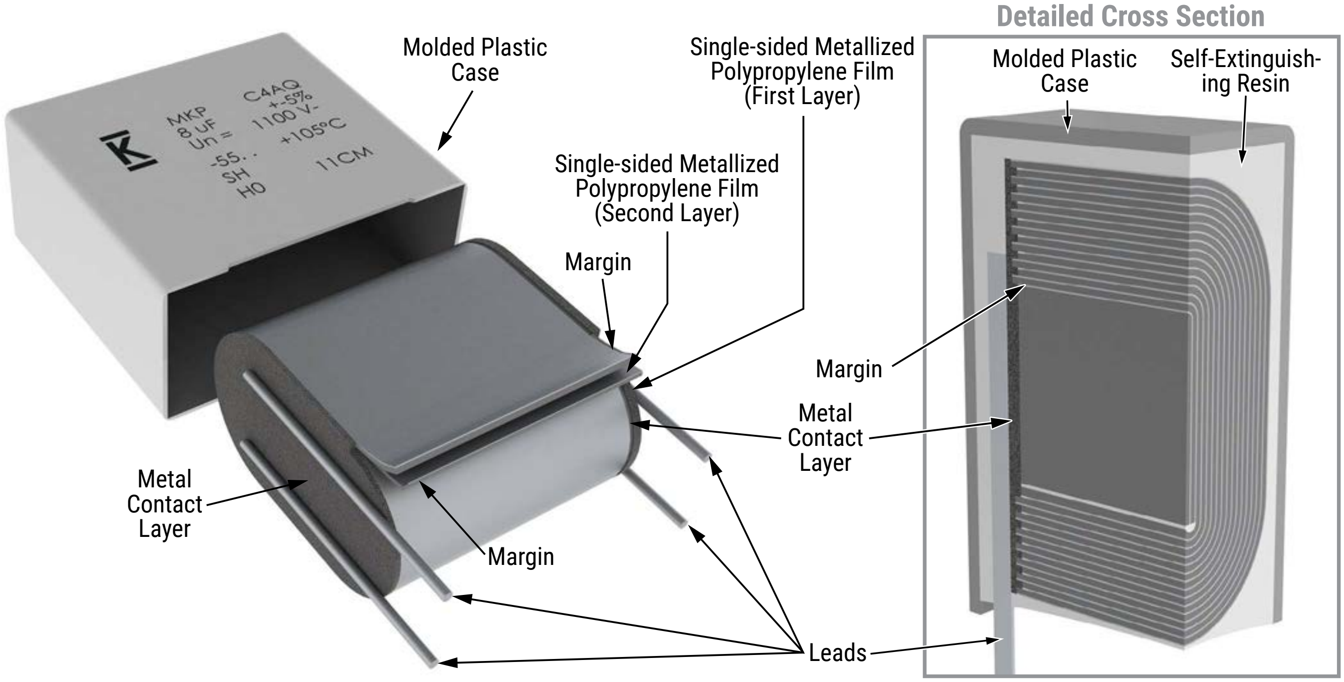


Selective Soldering Recommendations

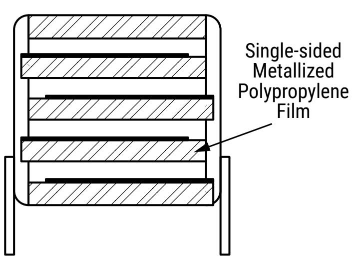
Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is pre-heated and transported over the solder bath, as in normal flow soldering, without touching the solder. When the board is over the bath, it is stopped. Pre-designed solder pots are lifted from the bath with molten solder, only at the places of the selected components, and pressed against the lower surface of the board to solder the components.

The temperature profile for selective soldering is similar to the double wave flow soldering outlined in this document. However, instead of two baths, there is only one with a time from 3 – 10 seconds. In selective soldering, the risk of overheating is greater than in double wave flow soldering, and great care must be taken so that the parts do not overheat.

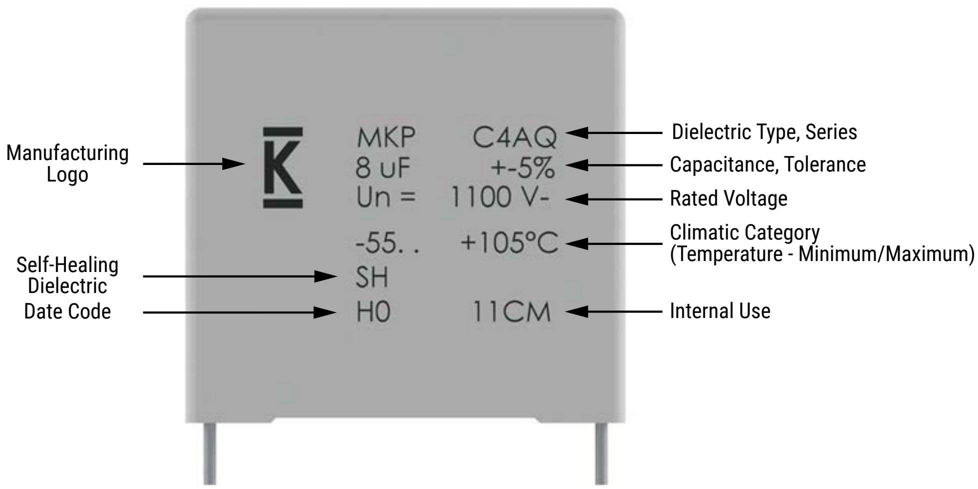
Construction



Winding Scheme



Marking



Manufacturing Date Code (IEC–60062)			
Y = Year, Z = Month			
Year	**Code**	**Month**	**Code**
2010	A	January	1
2011	B	February	2
2012	C	March	3
2013	D	April	4
2014	E	May	5
2015	F	June	6
2016	H	July	7
2017	J	August	8
2018	K	September	9
2019	L	October	O
2020	M	November	N
2021	N	December	D
2022	P		
2023	R		
2024	S		
2025	T		
2026	U		
2027	V		
2028	W		
2029	X		
2030	A		

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