ALF40, +105°C

Overview

The KEMET ALF40 press-fit capacitors eliminate the need for solder, the associated production and quality issues. They are the next evolution of snap-in capacitors, providing reliable electrical contact and the same vibration performance as soldered snap-in terminals. These capacitors cover a wide range of case sizes and voltage ratings. The ALF40 offers high voltages up to 500 VDC, high ripple currents, good surge voltage capability, and a very long life performance. Rated operating temperature is 105°C.

Applications

The ALF40 press-fit capacitors are suited for high reliability and long life applications, such as frequency converters, solar inverters, advanced energy storage systems, and switch mode power supplies (SMPS). The extended temperature range allows increased ripple currents at lower temperatures.

Benefits

- Eliminates the manufacturing problems of soldering onto thick PCB copper tracks, which act as heat-sinks
- Eliminates fractured solder joints/cold-solder
- Skipping the solder operation allows for easy insertion after the production washing process
- Capability to exchange components in the field

In addition to solving the solder issues, the ALF40 press-fit offers:

- Compact size
- Long life, up to 9,000 hours at +105°C (V_R, I_R applied)
- High ripple current
- High voltage up to 500 V
- Excellent surge voltage capability
- 35, 40, 45, and 50 mm diameters with 4 or 5 pin configuration
- Optimized designs available upon request



Part Number System

ALF40	C	822	EF	025	
Series	Termination	Capacitance Code (µF)	Size Code	Rated Voltage (VDC)	
Press-Fit Aluminum Electrolytic	See Termination Table	First two digits represent significant figures. Third digit specifies number of zeros.	See Dimension Table	025 = 25 040 = 40 063 = 63 100 = 100 200 = 200	250 = 250 350 = 350 400 = 400 500 = 500

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Performance Characteristics

Item	Performance Characteristics		
Capacitance Range	120 – 120,000 µF		
Rated Voltage	25 – 500 VDC		
Operating Temperature	–40 to +105°C		
Storage Temperature Range	–55 to +105°C		
Capacitance Tolerance	±20% at 100 Hz/+20°C		
Operational Lifetime	D (mm)	Rated Voltage and Ripple Current at +105°C (hours)	Rated Voltage at +105°C (hours)
	35	8,000	13,000
	40 – 50	9,000	14,000
End of Life Requirement	Δ C/C < ±10%, ESR < 2 x initial ESR value, IL < initial specified limit		
Shelf Life	2,000 hours at +85°C or 30,000 hours at +40°C 0 VDC		
Leakage Current	I = 0.003 CV or 6,000 µA (whichever is smaller)		
	C = rated capacitance (µF), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C.		
Vibration Test Specifications		Procedure	Requirements
	D ≤ 40 mm	0.75 mm displacement amplitude or 10 G maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 500 Hz (Capacitor clamped by body).	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed: Δ C/C < 5%
	D > 40 mm	0.35 mm displacement amplitude or 5 G maximum acceleration. Vibration applied for three 0.5-hour sessions at 10 – 55 Hz (Capacitor clamped by body).	
Standards	IEC 60384–4 long life grade 40/105/56		

Surge Voltage

Condition	Voltage (VDC)									
	25	40	63	100	200	250	350	400	450	500
≤ 30 second surge followed by a no load period of 330 seconds, 1,000 cycles at +85°C	28.75	46	72.5	115	230	288	385	440	495	550

Test Method & Performance

Endurance Life Test		
Conditions	Performance	
Temperature	+105°C	
Test Duration	5,000 hours	
Ripple Current	Rated ripple current in specified table	
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	
Performance	**The following specifications will be satisfied when the capacitor is tested at +20°C:**	
Capacitance Change	≤ 160 V	Within 15% of the initial value
	> 160 V	Within 10% of the initial value
Equivalent Series Resistance	Does not exceed 200% of the initial value	
Leakage Current	Does not exceed leakage current limit	

Dimensions – Millimeters

Size Code	Dimensions in mm		Approximate Weight Grams
	D	L	
	-0/+1	±2	
DB	35	30	42
DC	35	35	50
DD	35	40	55
DE	35	45	65
DF	35	50	70
DG	35	55	75
DH	35	60	80
DL	35	80	105
EB	40	30	49
EC	40	35	57
ED	40	40	65
EE	40	45	80
EF	40	50	82
EG	40	55	95
EH	40	60	98
EL	40	80	131
EP	40	105	170
FB	45	30	62
FC	45	35	72
FD	45	40	82
FE	45	45	92
FF	45	50	103
Note: Dimensions include sleeving			

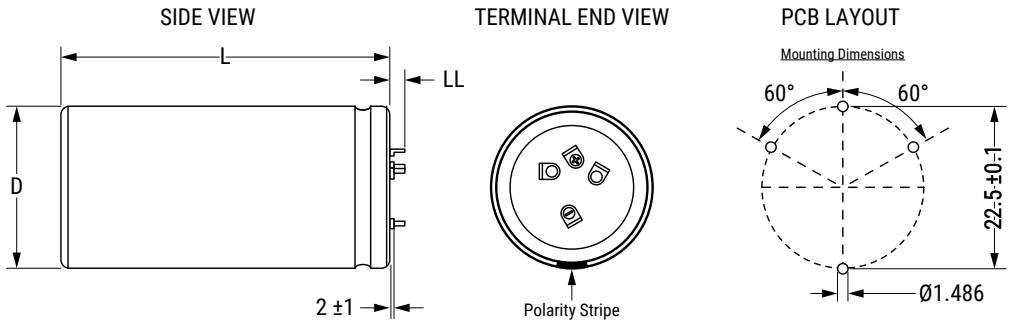
Size Code	Dimensions in mm		Approximate Weight Grams
	D	L	
	-0/+1	±2	
FG	45	55	113
FH	45	60	123
FL	45	80	164
FP	45	105	215
KB	50	30	75
KC	50	35	88
KD	50	40	100
KE	50	45	113
KF	50	50	126
KG	50	55	138
KH	50	60	151
KL	50	80	201
KP	50	105	264
KC	50	35	88
KD	50	40	100
KE	50	45	113
KF	50	50	126
KG	50	55	138
KH	50	60	151
KL	50	80	201
KP	50	105	264
Note: Dimensions include sleeving			

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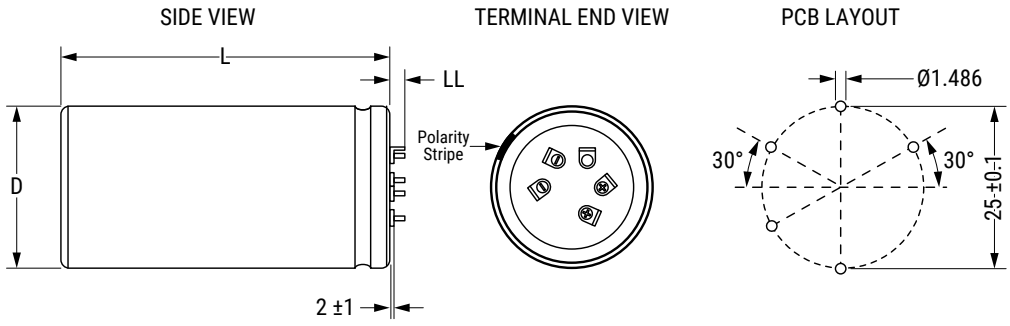
Termination Tables

Termination Code Diameter (mm)	C (4 Pin) LL = 5.5 ±1	G (5 Pin) LL = 5.5 ±1
35	•	
40	•	•
45	•	•
50	•	•
Dimensions in mm		
Mounting: These capacitors are designed to be mounted by their terminals alone and may be used in any position. The dummy pins must be isolated.		

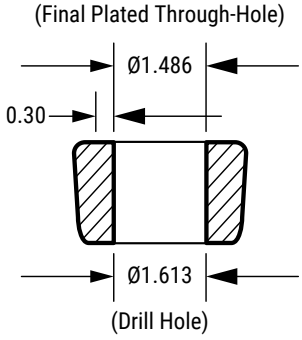
Style C



Style G



PCB Thickness: 1.57 mm Minimum	
DRILL	Ø1.613 ±0.025
COPPER THICKNESS	0.025 minimum
FINAL PLATED THROUGH-HOLE DIAMETER	Ø1.486 ±0.076
Pin Insertion Force: 125 N (28 lbf) maximum Pin Retention Force: 62 N (14 lbf) minimum	



Shelf Life

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however, the leakage current will very slowly increase. KEMET products are particularly stable and allow a shelf life in excess of three years at 40°C. See sectional specification under each product for specific data.

Re-Age (Reforming) Procedure

Apply the rated voltage to the capacitor at room temperature for a period of one hour, or until the leakage current has fallen to a steady value below the specified limit. During re-aging, a maximum charging current of twice the specified leakage current or 5 mA (whichever is greater) is suggested.

Reliability

The reliability of a component can be defined as the probability that it will perform satisfactorily under a given set of conditions for a given length of time.

In practice, it is impossible to predict with absolute certainty how any individual component will perform. Therefore, we must utilize probability theory. It is also necessary to clearly define the level of stress involved (e.g., operating voltage, ripple current, temperature and time.) Finally, the meaning of satisfactory performance must be defined by specifying a set of conditions which determine the end of life of the component.

Reliability as a function of time, R(t), is normally expressed as: $R(t) = e^{-\lambda t}$, where R(t) is the probability that the component will perform satisfactorily for time t, and λ is the failure rate.

Failure Rate

The failure rate is the number of components failing per unit of time. The failure rate of most electronic components follows the characteristic pattern:

- Early failures are removed during the manufacturing process.
- The operational life is characterized by a constant failure rate.
- The wear out period is characterized by a rapidly increasing failure rate.

The failures in time (FIT) are given with a 60% confidence level for the various type codes. By convention, FIT is expressed as 1×10^{-9} failures per hour. Failure rate is also expressed as a percentage of failures per 1,000 hours, e.g., 100 FIT = 1×10^{-7} failures per hour = 0.01%/1,000 hours.

End of Life Definition

Catastrophic Failure: short circuit, open circuit or safety vent operation

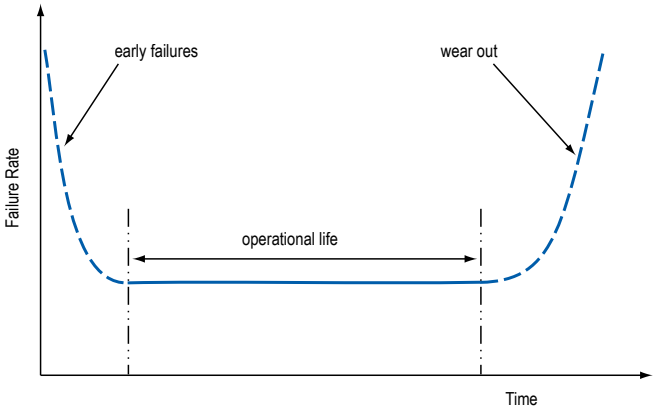
Parametric Failure:

- Change in capacitance > ±10%
- Leakage current > specified limit
- ESR > 2 x initial ESR value

MEAN TIME BETWEEN FAILURES

The mean time between failures (MTBF) is simply the inverse of the failure rate.

MTBF = 1/λ



The failure rate is derived from our periodic test results. The failure rate (λ_R) is, therefore, only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in failure in time (FIT), where 1 FIT = 1 x 10^{-9} failures per hour. Failure rate per hour includes both catastrophic and parametric failures.

T_a	Failure Rate per Hour
85°C	220 FIT
40°C	10 FIT

Environmental Compliance

All Part Numbers in this datasheet are Reach and RoHS compliant.

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

In Europe (RoHS Directive) and in some other geographical areas such as China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and 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 worldwide and make any necessary changes in its products, whenever needed.

Some customer segments such as 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.

Due to customer requirements, there may appear additional markings such as lead-free (LF), or lead-free wires (LFW) on the label.

Table 1 – Ratings & Part Number Reference

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum	Impedance Maximum	Part Number	SPQ	MOQ
	100 Hz 20°C (µF)		D x L (mm)	100 Hz 105°C (A)	10 kHz 105°C (A)	100 Hz 20°C (mΩ)	10 kHz 20°C (mΩ)			
25	22000	DC	35 x 35	2.91	3.1	116	104	ALF40C223DC025	100	200
25	27000	DD	35 x 40	3.34	3.56	96	86	ALF40C273DD025	100	200
25	27000	EB	40 x 30	4.03	4.09	75	69	ALF40(1)273EB025	72	216
25	33000	DF	35 x 50	4.32	4.61	70	63	ALF40C333DF025	100	200
25	33000	EC	40 x 35	4.83	4.9	66	62	ALF40(1)333EC025	72	216
25	39000	DF	35 x 50	4.32	4.61	69	62	ALF40C393DF025	100	200
25	39000	ED	40 x 40	5.57	5.65	53	49	ALF40(1)393ED025	72	216
25	47000	EF	40 x 50	7.3	7.4	41	37	ALF40(1)473EF025	36	216
25	56000	EG	40 x 55	7.51	7.61	38	35	ALF40(1)563EG025	36	216
25	82000	EL	40 x 80	11.06	11.24	22	20	ALF40(1)823EL025	36	216
25	120000	EP	40 x 105	13.41	14.05	18	17	ALF40(1)124EP025	36	216
40	12000	DC	35 x 35	2.77	3.08	121	106	ALF40C123DC040	100	200
40	12000	EB	40 x 30	4.13	4.22	88	79	ALF40(1)123EB040	72	216
40	15000	DD	35 x 40	3.18	3.53	100	87	ALF40C153DD040	100	200
40	15000	ED	40 x 40	5.66	5.78	63	56	ALF40(1)153ED040	72	216
40	18000	DF	35 x 50	4.12	4.58	73	64	ALF40C183DF040	100	200
40	18000	EE	40 x 45	6.46	6.6	53	47	ALF40(1)183EE040	72	216
40	22000	EF	40 x 50	7.34	7.5	43	39	ALF40(1)223EF040	36	216
40	27000	EG	40 x 55	7.5	7.63	39	35	ALF40(1)273EG040	36	216
40	47000	EL	40 x 80	10.42	10.59	23	21	ALF40(1)473EL040	36	216
40	68000	EP	40 x 105	12.71	13.47	17	16	ALF40(1)683EP040	36	216
63	5600	EB	40 x 30	3.82	3.91	102	90	ALF40(1)562EB063	72	216
63	6800	DC	35 x 35	2.5	2.9	141	119	ALF40C682DC063	100	200
63	6800	EC	40 x 35	4.18	4.26	91	81	ALF40(1)682EC063	72	216
63	8200	DD	35 x 40	2.87	3.33	116	99	ALF40C822DD063	100	200
63	8200	ED	40 x 40	5.01	5.12	72	64	ALF40(1)822ED063	72	216
63	10000	DF	35 x 50	3.71	4.31	85	72	ALF40C103DF063	100	200
63	10000	EE	40 x 45	5.69	5.81	60	53	ALF40(1)103EE063	72	216
63	12000	EF	40 x 50	6.5	6.64	50	44	ALF40(1)123EF063	36	216
63	15000	EH	40 x 60	7.81	7.99	39	34	ALF40(1)153EH063	36	216
63	22000	EL	40 x 80	9.7	9.92	27	24	ALF40(1)223EL063	36	216
63	33000	EP	40 x 105	12.01	13.01	18	17	ALF40(1)333EP063	36	216
100	2200	DC	35 x 35	2.1	2.67	177	142	ALF40C222DC100	100	200
100	2200	EB	40 x 30	3.58	3.8	128	110	ALF40(1)222EB100	72	216
100	2700	DD	35 x 40	2.41	3.07	146	118	ALF40C272DD100	100	200
100	2700	ED	40 x 40	4.92	5.24	95	80	ALF40(1)272ED100	72	216
100	3300	DF	35 x 50	3.12	3.97	108	86	ALF40C332DF100	100	200
100	3300	EE	40 x 45	5.59	5.95	78	66	ALF40(1)332EE100	72	216
100	3900	EF	40 x 50	6.41	6.83	65	55	ALF40(1)392EF100	36	216
100	4700	EG	40 x 55	6.67	7.04	58	50	ALF40(1)472EG100	36	216
100	5600	EH	40 x 60	7.46	7.87	49	42	ALF40(1)562EH100	36	216
100	8200	EL	40 x 80	9.28	9.78	34	29	ALF40(1)822EL100	36	216
100	10000	EP	40 x 105	11.33	13.12	24	21	ALF40(1)103EP100	36	216
200	680	EB	40 x 30	2.97	3.67	202	158	ALF40(1)681EB200	72	216
200	820	DC	35 x 35	1.7	2.34	252	191	ALF40C821DC200	100	200
200	820	EC	40 x 35	3.35	4.06	173	137	ALF40(1)821EC200	72	216
200	1000	DD	35 x 40	1.95	2.69	208	158	ALF40C102DD200	100	200
200	1000	ED	40 x 40	3.92	4.8	140	110	ALF40(1)102ED200	72	216
200	1200	DF	35 x 50	2.5	3.48	159	119	ALF40C122DF200	100	200
200	1200	EE	40 x 45	4.5	5.5	116	91	ALF40(1)122EE200	72	216
200	1500	EF	40 x 50	5.13	6.23	94	74	ALF40(1)152EF200	36	216
200	1800	EH	40 x 60	6.1	7.53	76	60	ALF40(1)182EH200	36	216
200	2700	EL	40 x 80	7.62	9.32	52	41	ALF40(1)272EL200	36	216
200	3900	EP	40 x 105	7.9	12.31	49	34	ALF40(1)392EP200	36	216
200	5600	FP	45 x 105	8.68	12.54	40	28	ALF40(1)562FP200	30	120
200	6800	KP	50 x 105	9.08	12.29	36	26	ALF40(1)682KP200	24	96
250	470	EB	40 x 30	2.59	3.49	258	193	ALF40(1)471EB250	72	216
250	560	DC	35 x 35	1.57	2.25	297	217	ALF40C561DC250	100	200
250	560	EC	40 x 35	3.05	4.16	221	166	ALF40(1)561EC250	72	216
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR	Impedance	Part Number	SPQ	MOQ

(1) Termination code: See Termination Tables for available options.

Table 1 – Ratings & Part Number Reference cont.

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum	Impedance Maximum	Part Number	SPQ	MOQ
	100 Hz 20°C (µF)		D x L (mm)	100 Hz 105°C (A)	10 kHz 105°C (A)	100 Hz 20°C (mΩ)	10 kHz 20°C (mΩ)			
250	680	DD	35 x 40	1.8	2.59	245	179	ALF40C681DD250	100	200
250	680	ED	40 x 40	3.49	4.76	180	134	ALF40(1)681ED250	72	216
250	820	DF	35 x 50	3.12	4.66	190	137	ALF40C821DF250	100	200
250	820	EE	40 x 45	4.01	5.46	149	111	ALF40(1)821EE250	72	216
250	1000	DH	35 x 60	3.61	5.78	164	125	ALF40C102DH250	50	200
250	1000	EF	40 x 50	4.58	6.22	123	92	ALF40(1)102EF250	36	216
250	1200	EG	40 x 55	4.93	6.51	106	80	ALF40(1)122EG250	36	216
250	1500	DL	35 x 80	4.43	6.88	112	90	ALF40C152DL250	50	200
250	1800	EL	40 x 80	6.77	9.27	67	50	ALF40(1)182EL250	36	216
250	2700	EP	40 x 105	7.05	12.03	62	42	ALF40(1)272EP250	36	216
250	3900	FP	45 x 105	7.9	12.43	50	33	ALF40(1)392FP250	30	120
250	4700	KP	50 x 105	8.36	12.3	44	30	ALF40(1)472KP250	24	96
350	270	EB	40 x 30	1.97	4.36	448	291	ALF40(1)271EB350	72	216
350	330	DC	35 x 35	1.79	3.24	378	260	ALF40C331DC350	100	200
350	390	DD	35 x 40	2.02	3.67	317	218	ALF40C391DD350	100	200
350	390	ED	40 x 40	2.64	5.73	312	203	ALF40(1)391ED350	72	216
350	470	DF	35 x 50	2.72	4.9	251	170	ALF40C471DF350	100	200
350	470	EE	40 x 45	3	6.46	258	168	ALF40(1)471EE350	72	216
350	560	DF	35 x 50	2.57	4.44	224	155	ALF40C561DF350	100	200
350	560	DH	35 x 60	3.11	5.7	224	155	ALF40C561DH350	50	200
350	560	EF	40 x 50	3.41	7.27	216	141	ALF40(1)561EF350	36	216
350	680	EH	40 x 60	3.99	8.39	177	114	ALF40(1)681EH350	36	216
350	820	DL	35 x 80	3.82	6.72	150	102	ALF40C821DL350	50	200
350	1000	EL	40 x 80	5	9.98	120	78	ALF40(1)102EL350	36	216
350	1500	EP	40 x 105	6	11.47	99	68	ALF40(1)152EP350	36	216
350	2200	FP	45 x 105	6.79	12.06	77	53	ALF40(1)222FP350	30	120
350	2700	KP	50 x 105	7.34	12.08	66	45	ALF40(1)272KP350	24	96
400	220	EB	40 x 30	1.88	4.36	521	320	ALF40(1)221EB400	72	216
400	270	DC	35 x 35	1.73	3.23	470	322	ALF40C271DC400	100	200
400	270	EC	40 x 35	2.21	4.95	430	266	ALF40(1)271EC400	72	216
400	330	DD	35 x 40	1.98	3.64	386	266	ALF40C331DD400	100	200
400	330	ED	40 x 40	2.56	5.76	350	216	ALF40(1)331ED400	72	216
400	390	DF	35 x 50	2.64	4.66	323	221	ALF40C391DF400	100	200
400	390	EE	40 x 45	2.88	6.48	295	182	ALF40(1)391EE400	72	216
400	470	DE	35 x 45	2.5	4.73	300	192	ALF40C471DE400	100	200
400	470	DF	35 x 50	2.51	4.4	277	192	ALF40C471DF400	100	200
400	470	DH	35 x 60	3.04	5.78	270	185	ALF40C471DH400	50	200
400	470	EF	40 x 50	3.28	7.3	245	151	ALF40(1)471EF400	36	216
400	560	EG	40 x 55	3.62	7.78	209	130	ALF40(1)561EG400	36	216
400	680	DL	35 x 80	3.72	6.69	200	131	ALF40C681DL400	50	200
400	680	EH	40 x 60	4.08	8.58	173	107	ALF40(1)681EH400	36	216
400	1000	EL	40 x 80	4.85	10.16	118	73	ALF40(1)102EL400	36	216
400	1200	EP	40 x 105	5.76	11.46	103	70	ALF40(1)122EP400	36	216
400	1800	FP	45 x 105	6.48	12.04	82	55	ALF40(1)182FP400	30	120
400	2200	KP	50 x 105	7.02	12.08	70	47	ALF40(1)222KP400	24	96
450	120	DC	35 x 35	1.36	3.11	810	565	ALF40C121DC450	100	200
450	150	DD	35 x 40	1.57	3.53	651	454	ALF40C151DD450	100	200
450	150	EB	40 x 30	1.73	4.14	642	447	ALF40(1)151EB450	72	216
450	180	DF	35 x 50	1.88	4.27	541	377	ALF40C181DF450	100	200
450	180	EC	40 x 35	2.01	4.7	538	374	ALF40(1)181EC450	72	216
450	220	DF	35 x 50	2.28	4.71	449	315	ALF40C221DF450	100	200
450	220	ED	40 x 40	2.34	5.47	440	306	ALF40(1)221ED450	72	216
450	270	EF	40 x 50	2.8	6.74	356	248	ALF40(1)271EF450	36	216
450	330	DF	35 x 50	2.53	5.14	206	140	ALF40C331DF450	100	200
450	330	DH	35 x 60	2.91	5.53	285	198	ALF40C331DH450	50	200
450	330	EG	40 x 55	3.14	7.29	293	204	ALF40(1)331EG450	36	216
450	390	EH	40 x 60	3.5	8.04	249	174	ALF40(1)391EH450	36	216
450	470	DH	35 X 60	3	5.82	232	148	ALF40C471DH450	50	200
450	470	DL	35 x 80	3.51	6.68	203	138	ALF40C471DL450	50	200
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR	Impedance	Part Number	SPQ	MOQ

(1) Termination code: See Termination Tables for available options.

Table 1 – Ratings & Part Number Reference cont.

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum	Impedance Maximum	Part Number	SPQ	MOQ
	100 Hz 20°C (µF)		D x L (mm)	100 Hz 105°C (A)	10 kHz 105°C (A)	100 Hz 20°C (mΩ)	10 kHz 20°C (mΩ)			
450	560	EL	40 x 80	4.32	9.57	175	122	ALF40(1)561EL450	36	216
450	820	EL	40 X 80	4.3	10.04	154	98	ALF40(1)821EL450	36	216
450	820	EP	40 x 105	5.34	11.05	121	85	ALF40(1)821EP450	36	216
450	1200	FP	45 x 105	5.84	11.64	105	71	ALF40(1)122FP450	30	120
450	1500	KP	50 x 105	6.44	11.85	86	59	ALF40(1)152KP450	24	96
500	150	DC	35 x 35	1.51	2.88	1500	1210	ALF40C151DC500	100	200
500	180	DD	35 x 40	1.71	3.26	1250	1010	ALF40C181DD500	100	200
500	180	EB	40 x 30	1.77	3.55	1250	1010	ALF40(1)181EB500	72	216
500	220	EC	40 x 35	2.03	4.09	1020	820	ALF40(1)221EC500	72	216
500	270	DF	35 x 50	2.2	4.06	840	680	ALF40C271DF500	100	200
500	270	ED	40 x 40	2.32	4.66	830	670	ALF40(1)271ED500	72	216
500	330	DH	35 x 60	2.52	4.62	690	560	ALF40C331DH500	50	200
500	390	EF	40 x 50	2.94	5.81	580	470	ALF40(1)391EF500	36	216
500	470	DL	35 x 80	3.14	5.61	480	390	ALF40C471DL500	50	200
500	470	EG	40 x 55	3.3	6.42	480	390	ALF40(1)471EG500	36	216
500	680	EL	40 x 80	4.25	8.14	330	270	ALF40(1)681EL500	36	216
500	820	EP	40 x 105	4.71	8.95	280	220	ALF40(1)821EP500	36	216
500	1000	FP	45 x 105	5.52	10.08	230	190	ALF40(1)102FP500	30	120
500	1200	KP	50 x 105	6.27	11	190	160	ALF40(1)122KP500	24	96
VDC	**Rated Capacitance**	**Size Code**	**Case Size**	**Ripple Current**		**ESR**	**Impedance**	**Part Number**	**SPQ**	**MOQ**

(1) Termination code: See Termination Tables for available options.

Mechanical Data

Polarity and Reversed Voltage
Aluminium electrolytic capacitors manufactured for use in DC applications contain an anode foil and a cathode foil. As such, they are polarized devices and must be connected with the +ve to the anode foil and the -ve to the cathode foil. If this were to be reversed, then the electrolytic process that took place in forming the oxide layer on the anode would be recreated in trying to form an oxide layer on the cathode. In forming the cathode foil in this way, heat would be generated and gas given off within the capacitor, usually leading to catastrophic failure.

The cathode foil already possesses a thin stabilized oxide layer. This thin oxide layer is equivalent to a forming voltage of approximately 2 V. As a result, the capacitor can withstand a voltage reversal of up to 2 V for short periods. Above this voltage, the formation process will commence. Aluminium Electrolytic capacitors can also be manufactured for use in intermittent AC applications by using two anode foils in place of one anode and one cathode.

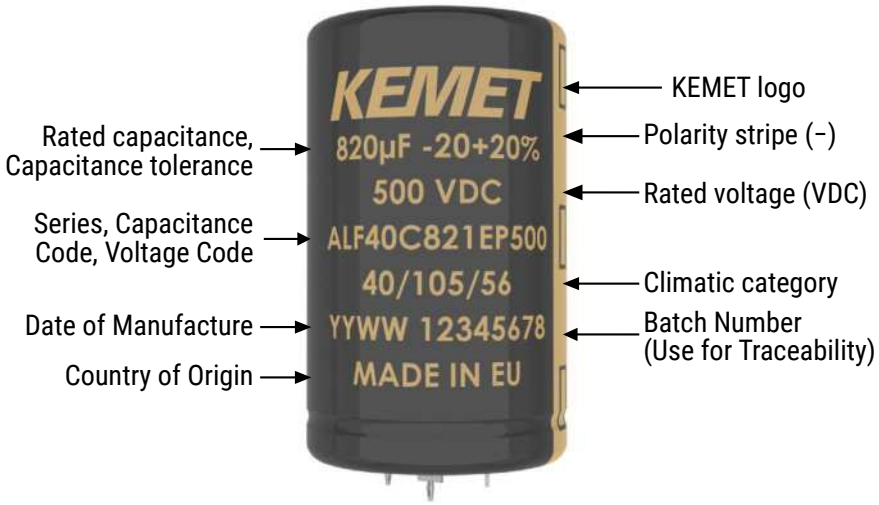
Mounting Position
The capacitor can be mounted upright or inclined to a horizontal position.

Insulating Resistance
≥ 100 MΩ at 100 VDC across insulating sleeve.
UL recognized sleeving is available for custom parts in this range, upon request (UL No. E358957.)

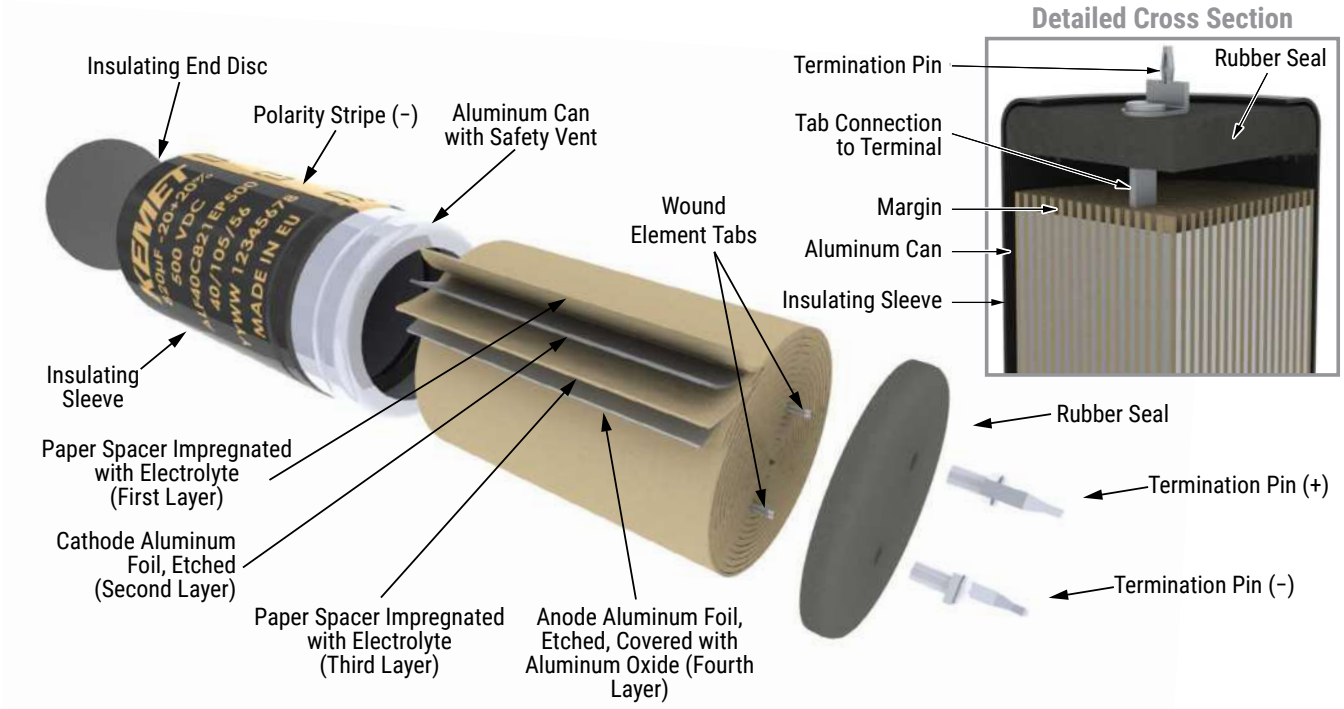
Voltage Proof
≥ 2,500 VDC across insulating sleeve.

Safety Vent
A safety vent for overpressure is featured on either the base (opposing end to the terminals) or the side of the can. This appears in the form of a grooved section on the surface of the can, which is a weakened area and designed to relieve build-up of internal pressure due to overstress or catastrophic failure.

Marking

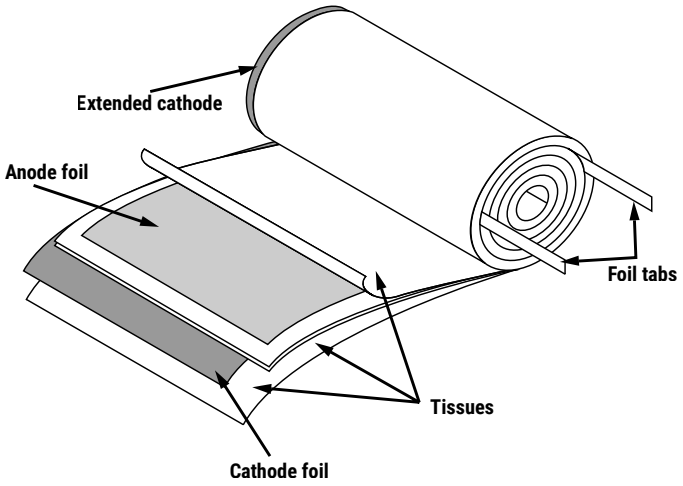


Construction



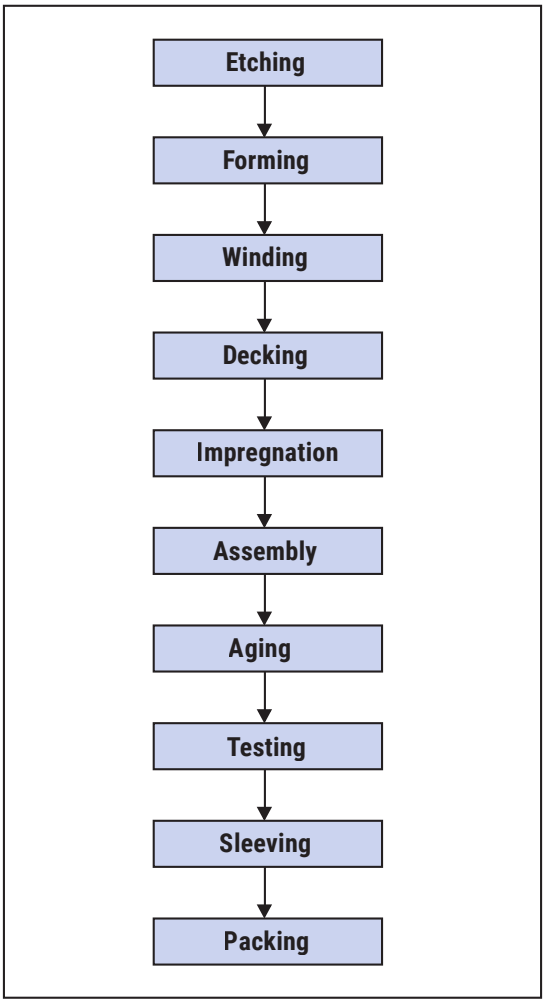
Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then "formed" to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being sleeved and packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete.



Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A sample from each batch is taken by the quality department after completion of the production process. This sample size is controlled by the use of recognized sampling tables defined in BS 6001.

The following tests are applied and may be varied at the request of the customer. In this case the batch, or special procedure, will determine the course of action.

Electrical:

- Leakage current
- Capacitance
- ESR
- Impedance
- Tan Delta

Mechanical/Visual:

- Overall dimensions
- Torque test of mounting stud
- Print detail
- Box labels
- Packaging, including packed quantity

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